CMHC SCHL
Helping to house Canadians
Canada

CONSUMER HOUSING CHOICES AND THE ENVIRONMENT

92-07779/

Consumer Housing Choices and the Environment

Presented to

Research Division
Canada Mortgage and Housing Corporation

by

Energy Pathways Inc.

May 31, 1991

TABLE OF CONTENTS

EXECUTIVE SUMMARY 1

1.0 RESEARCH LIMITATIONS 4

2.0 UNDERLYING MARKET THEORY 5

3.0 PROJECT METHODOLOGY 8

4.0 PHASE ONE: RESULTS AND ANALYSIS 10

- 4.1 Context and Process 10
- 4.2 Key Findings and Analysis 10
- 4.3 Conventional Factors That Influence Housing Choices 14

5.0 PHASE TWO: RESEARCH SUMMARY 17

- 5.1 The Base-Case Models 18
- 5.2 The Option Packages 19

6.0 PHASE THREE: RESULTS AND ANALYSIS 22

- 6.1 Context and Process 22
- 6.2 Key Findings and Analysis 23

7.0 CONCLUSIONS 29

Appendix A: SUMMARY OF IMPACT OF CONSUMER HOUSING CHOICES ON ENVIRONMENTAL PERFORMANCE

Appendix B: FOCUS GROUP RECRUITMENT SCREENING

Appendix C: PHASE ONE FINDINGS: EXPECTED TRENDS IN HOUSING

Appendix D: PHASE TWO DATA SOURCES

Appendix E: DOCUMENTATION

EXECUTIVE SUMMARY

This project examined the manner in which consumer choices could affect the commercial development of environmentally improved housing. Both new and existing housing were included in the research.

Objectives:

1) To gain insight into the range of consumer housing choices that affect the environment and to examine environmentally improved technologies and techniques that exist and are commercially available. Some pre-commercial technologies were also to be considered.

2) To develop an understanding of how information on environmental housing choices could be effectively communicated to consumers so that they could act in a knowledgeable and confident manner.

Methodology:

The primary research methods used in this project were qualitative. Focus group sessions were held in Ottawa, Ontario, and Peterborough, Ontario. Consumers participating in these sessions were *early adopters*, a segment of the population that has a disproportionately significant influence on housing trends.

The research findings should be viewed as directional, providing an indication of how consumers would react to available environmental housing features. Findings identify some of the barriers to such features' acceptance and provide insight into how environmentally improved housing is linked to consumer wants and needs.

The project was organized in three phases. Phase One involved research on participants' pre-existing attitudes, knowledge, and understanding in relation to environmental housing concepts. Phase Two involved the development of quantitative information about the environmental impacts of currently available housing and a range of environmental improvements. Phase Three centred on testing this information with participants and examining how increased knowledge affected their housing choices.

Phase One research indicated that participants' current view of housing options did not include environmental features, but that participants did expect housing to provide reduced environmental impacts in the future. Participants exhibited a greater understanding of the linkages between housing and the environment than was expected. At the same time, participants lacked the detailed knowledge that would support comparative analysis and selection of housing options affecting the environment.

Phase Two centred on developing the information that the initial focus group sessions indicated was required for participants to critically examine environmental housing options. In examining the range of available

technology, it became clear that measures that could significantly reduce housing-related environmental impacts do exist and are generally available.

The identified housing options could reduce energy consumption in new housing by as much as 70 percent and water usage by 40 percent. As well, design improvements could reduce floor areas by 12 to 15 percent with little impact on liveability. In addition, domestic waste disposal systems, which would require householder participation, could reduce both solid waste volume by 70 percent and mass by 40 percent. As a package, these alterations and enhancements could have very little impact on housing costs or affordability.

These environmental options were integrated within a communications package that included conventional non-environmental items. The complete package was designed to support consumer choice, based on the findings of Phase One.

Phase Three research found that a broad consensus emerged as participants examined both environmental and conventional housing options. Employing a number of criteria, participants showed a clear preference for environmental features that improved indoor air quality, provided a more space-efficient house design, and delivered significant reductions in energy and water use. The participants were confident when selecting these options for new homes; they were far less certain about older homes and the renovation process. Generally, environmental features were viewed to enhance the quality of housing.

Major research findings included the following:

- Substantial environmental gains can be made in new housing by the application of existing technologies.

- When environmental features were presented realistically, participants consistently chose the options that delivered the most substantial environmental benefits.

Based on this research process, a number of conclusions can be drawn:

- A latent market for environmentally improved new housing is developing. Consumers appear willing to invest in environmental housing features when selecting a new home.

- Lack of consumer knowledge about environmental housing options creates a significant barrier to change. Consumers have a broad, general knowledge of the linkages between housing and the environment, but lack the detailed knowledge needed to support choices.

- Individuals used a range of criteria in their housing choices. These include perceived economic, health, and lifestyle benefits; a concept of social responsibility; and a determination of value for money. Participants were less likely to select an option that violated one or more of these criteria. Generally, participants expect environmental features to add to, not subtract from, the overall appeal of a home.

- The introduction of environmental features into the home renovation market appears more problematic than with new homes. Consumers are less certain when faced with renovation options than with new home options.

- Consumers will react to and demand environmental housing features when they view them as being "here and now". Such consumer demand would stimulate commercialization by home builders.

This research project indicates that there is a significant opportunity to accelerate the adoption of environmental housing features in the new-home market. For this to be achieved, consumers will require effective information.

1.0
RESEARCH LIMITATIONS

This project investigated the relationship between consumer choices and a range of housing features that reflect the current state of technology and that offer reduced environmental impacts. The term "choice" in this case represents the expression of individual wants and needs within the housing marketplace. This project had less to do with technology than with how consumer awareness, knowledge, and attitudes might influence the adoption of technology.

The primary research methods used in this project were qualitative, and the reader needs to be aware of the limitations of such methods. Qualitative research is not population-representative; there is no statistical relationship between the participants in this research and the general population.

The purpose of qualitative research is to provide insight into the relationship between individual attitudes and the forces that affect those attitudes. Where statistical research can measure the frequency of a particular attitude or opinion, qualitative methods provide an understanding of why those attitudes and opinions are held. Many statistical researchers have established that the public is increasingly aware and concerned about environmental issues. This project has investigated how such increased awareness and concern might affect choices about housing.

Qualitative research has two primary applications — in the development of communications and in the marketing of products. It is less frequently used to guide public policy development. The marketing applications provide the best illustration of the utility of the research; product marketers rely on qualitative research because it can explain why people make the choices they made. Virtually all name-brand advertising is driven by qualitative research. While this may be a dubious legacy, these methods are used because they produce results.

The specific methodology developed for this project reflects the evolving nature of environmentally improved housing technology. Most of these technologies exist, but are not clearly understood or perceived in a comprehensive way by the public. The research was organized to allow investigation of pre-existing awareness, knowledge and attitudes; and then to provide for the testing of reactions to the new information and concepts.

The research findings should be viewed as directional; that is to say, they provide an indication of how individuals integrate information and form opinions. This research does not provide a hard and fast blueprint of how environmentally improved housing should be explained or marketed. What it does provide is guidance on how a particular group of individuals sees the housing marketplace and the manner in which they analyze new information about housing options. The findings identify some of the barriers that could limit acceptance of new, environmentally oriented housing features, at the same time offering insight into how such features could be effectively explained and linked to the wants and needs of consumers.

2.0
UNDERLYING MARKET THEORY

The selection of participants for this research project was based on a well-defined concept of how housing, as a product, evolves and how new features and technology are adopted by builders. There are two elements to this market theory.

The first element has to do with the nature of the housing industry itself. For the most part, this industry is made up of small companies, which build only 10 or 15 homes each year. Larger firms exist in only a few metropolitan markets, and there are no "national" home building firms. The home building industry is small by industrial standards and undercapitalized. Successful firms tend to be risk-adverse; as a consequence, the adoption of new technology takes place slowly and with understandable caution on the part of the builder.

Traditionally, technical innovation in housing first occurs in the custom construction and renovation area, where the high initial cost of innovation is less of a constraint. More recently, CMHC and others have developed training programs with the aim of more rapidly transferring new technology to the mainstream builder. Notwithstanding these efforts, most builders remain prudently conservative in relation to housing trends. Builders do not lead the market, but prefer to follow it. Trends and technology are adopted once the marketplace has clearly indicated that it wants such changes.

The second element of this market theory relates to the origin of the demand for innovation. If the builder follows the market, which segment of the market provides leadership? It is generally accepted that, within a population, individuals will react to innovation in different ways. In broad terms, this can be modeled in the following way:

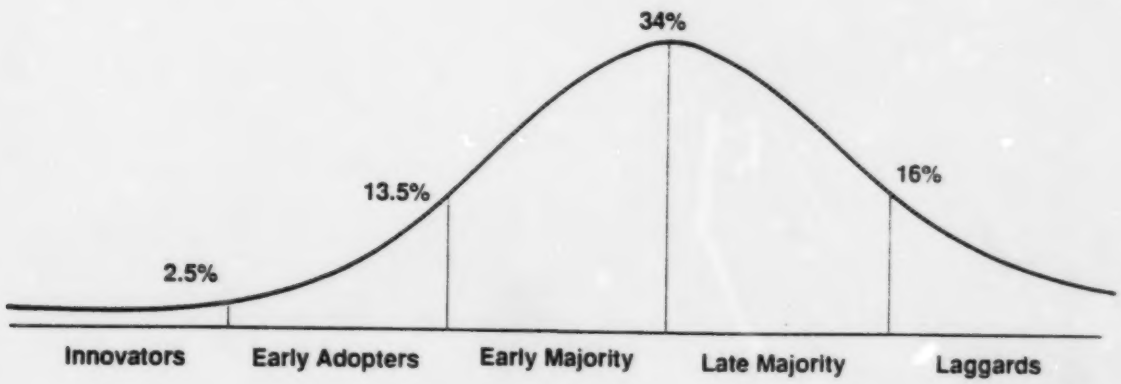


FIGURE 1: ADOPTER CATEGORIZATION, FROM ROGERS, ET AL.

The adoption of an innovation is a continuous, rather than an instantaneous process. Not all individuals accept change at the same pace. As well, there is a social dimension to how change occurs; adoption by one group is often dependent upon earlier adoption by others.

In terms of the housing industry, there is strong evidence that the *early adopter* segment of the consuming public has a disproportionately significant influence on housing trends. If we accept that the builder follows the market, then the *early adopter group* is the segment of the market being followed.

Early adopters share specific characteristics. Everett Rogers, who did the seminal work in this area, describes the early adopter as follows:

> *"[Others] . . . look to the early adopter for advice and information about the innovation. The early adopter is considered by many as 'the man to check with' before using a new idea. Because early adopters are not too far ahead of the average individual in innovativeness, they serve as a role model for others. The early adopter is respected by his peers. He is the embodiment of successful and discreet use of new ideas. And the early adopter knows that he must continue to earn this esteem of his colleagues if his position in the social structure is to be maintained."*
>
> Communication of Innovations, Second Edition, E. M.Rogers et al. 1971

Those who fall within the early adopter group share a number of characteristics, among which are that:

- They tend to be active in community life.
- They tend to prefer newspapers to television as an information source.
- Their purchasing decisions are influenced more by information than by the actions of others.
- They are willing to express a dissenting opinion.
- They read books.
- They tend to belong to business and community organizations.

Using these, and other characteristics, early adopters can be screened from the general population with some degree of certainty. For this project, two such groups were recruited; one in Ottawa, Ontario, and the other in Peterborough, Ontario. Each group was composed of 12 members with approximately equal numbers of men and women.

In relation to housing, previous research by the consultants had found early adopters to hold fairly balanced opinions about new technology and other innovative housing concepts. Early adopters do not accept technological change for its own sake; a number of criteria are applied in assessing new ideas. Chief among these criteria are perceptions about the *relative advantage*, *compatibility* and *"trialability"* of a new concept or product.

Relative advantage is the degree to which a new idea or product is perceived as being better than that which it supersedes. Innovations perceived to be advantageous will be adopted more quickly.

Compatibility is the degree to which a new idea or product is perceived to be consistent with an individual's values, needs and experiences. Lack of compatibility will act as a barrier to change.

Trialability is the degree to which an idea or product can be experimented with on a limited basis or with a minimum of risk. Changes that can be accomplished on an incremental basis are more likely to prove successful.

These concepts are not purely academic; they are influential forces at work in the marketplace today. A review of the development of energy-efficient housing over the last 15 years shows that success in the marketplace has tended to reflect to these influences. There has been a very wide gulf between what was technically and economically feasible and what the marketplace was willing to accept. Given that the marketplace is the final arbiter in such matters, this seems the logical place to start when considering how environmental features might come to influence the housing choices of consumers.

In practical terms, this project was organized around the two groups of early adopter recruits. It is the project team's belief that these individuals can provide considerable insight into how environmental housing features can be successfully integrated into the housing marketplace.

3.0
PROJECT METHODOLOGY

This project had two primary objectives.

The first objective was to gain insight into the range of consumer housing choices that affect the environment. Researchers were then to examine environmentally improved technologies that exist and are commercially available and some that are pre-commercial.

The second objective was to develop an understanding of how information about environmental housing choices could be effectively communicated to consumers. In this case, effectiveness was defined as empowerment of consumers resulting from the provision of information. In essence, effective communications would allow individuals to act in a knowledgeable and confident manner.

The research project was organized into three phases:

Phase One involved two focus groups, one held in Ottawa, the other in Peterborough. These sessions were designed to probe participants' awareness, knowledge, and attitudes regarding conventional and environmental housing features. Discussion was organized to allow environmental concepts to emerge from open-ended, rather than directed, dialogue. Techniques included comparative analysis of current housing (i.e., best and worst features) and projection exercises (i.e., what will new homes be like in the future?). Care was taken to avoid any moderator bias towards environmental aspects of the discussion. Participants were given no information to support discussion; all concepts arising in this session were the participants' own.

The Phase One sessions were subsequently analyzed, and an interim report submitted to CMHC project management.

Phase Two activities centred on developing information that would more fully allow participants to consider environmental features when making housing choices. The plan involved development of quantitative data that illustrated how housing impacts on the environment. This plan was followed, taking into account the results of Phase One discussions.

Two information "sets" were developed. The first consisted of three "base" homes representing the range of housing currently occupied by participants. Illustrative descriptions were developed for each, including both conventional characteristics and environmental aspects such as energy and water use, and waste production.

The second information "set" consisted of option packages representing the range of environmentally friendly options available, along with conventional options. These options fell into three broad categories: environmental features, health and safety features, and conventional

features. A common presentation format was developed and the ordering of the options was random to reduce the potential for bias.

These options were presented in a commercially realistic manner. Costing was carried out in consultation with a leading home-building firm. Where a technology was not fully commercialized, costing was based on a judgment of price once fully commercial.

Phase Three involved reassembly of the two discussion groups. The "base" homes were presented and discussed fully. Participants, presented with the option packages for each home, individually carried out a simulated purchase. For each case, a purchase budget was set. The level of this budget forced participants to choose, or "trade-off" features. In addition to making these choices, participants undertook a written exercise, evaluating the resulting homes. Following the purchase exercise, the groups discussed selected and non-selected options.

Both Phase One and Three sessions were audio-taped to allow detailed analysis by the project team. The Ottawa sessions were held in a research facility with remote observation; project team members and CMHC staff observed these sessions.

4.0
PHASE ONE
RESULTS AND ANALYSIS

4.1 Context and Process

The purpose of Phase One research was to determine the participants' awareness of the environmental aspects of housing and to probe underlying attitudes and knowledge in this area.

When recruited, participants were told that the discussion session would deal with "housing"; no elaboration was provided and no mention of environmental considerations was made. During the initial portion of the session, participants were asked to discuss their current home, to identify features they liked and disliked about it, and to comment on trends they see affecting housing. This discussion was then expanded to deal with the types of change participants felt were needed to improve new housing. This segment ended with a written exercise, in which participants described how they expected homes to be built 10 to 15 years in the future. At this point, with both discussion groups, environmental features were dominant among those features mentioned. To this point, the moderator had not introduced the subject of "environment"; participant discussion in this area was spontaneous and unprompted.

The second portion of the Phase One discussions then focused on the environmental aspects of housing. Again, participants were given no information. The groups were asked to identify the ways in which housing affects the environment and the comparative seriousness of these impacts. Discussion followed about how these impacts could be reduced. The session ended with a second written exercise, in which participants described what an "Environmental Home" might be like. Specific questions about the appearance of such a house, the technology it would contain and the manner in which such a home might affect lifestyle were posed in order to provide a response framework.

The information that emerged from Phase One represents a montage of what these individuals knew and believed about housing and the environment. Again, it is important to stress that participants were provided with no additional information in this session, nor did the moderator express any opinion about the validity of the information that participants offered up.

4.2 Key Findings and Analysis

1) Participants had a much higher level of understanding about the ways in which housing affects the environment than was expected. In broad terms, they recognize how their homes affect the environment. What they appear to lack is the knowledge required to quantify the environmental impact and to compare alternatives.

Participants were able to draw a fairly comprehensive picture of how housing affects the environment. This included resource inputs, land-use impact, solid waste issues, energy-related emissions, water usage, and

transportation-related impact. For the most part, this understanding seems to result from media coverage of issues rather than from government or industry information.

Participants had considerably more difficulty in quantifying these impacts, in stating how serious specific impacts are, and in comparing the relative advantages of various remedial measures. For instance, many cite water-conserving shower heads as one way to reduce water use. However, none is certain how much water a home normally uses or the degree of water savings delivered by these conserving shower heads. In many cases, this inability to comparatively analyze options served as a source of frustration.

In some cases, problems are recognized but lack of knowledge seriously impairs understanding. The majority of participants expect that house construction will see a significant shift from wood materials to plastic structural and finishing materials; this is because the environmental impact of wood use is believed to be greater than the impact associated with plastics and other manufactured materials. This perception seems to reflect media coverage of forestry issues rather than information specifically related to housing.

2) When asked to comment on what they liked and disliked about homes, participants reacted to what they see in the marketplace and the personal experience of living in their own homes. Their concerns are very much rooted in the "here and now". Current perceptions of housing continue to be dominated by concern about the quality of materials and workmanship in new homes. Poor interior design and layout are also emerging as issues.

In Ontario, the quality of new homes has been a major concern of consumers for a number of years. Many participants believe that the quality of materials and workmanship in new homes is unacceptably low. Poor interior design and space utilization are also emerging as major irritants, particularly among upscale home owners. A number of participants had moved up to newer homes in the 3,500- to 4,000-sq.-ft. range; many of these now want smaller homes that offer more efficient use of space, less maintenance, and lower taxes.

The issue of housing quality also affects how individuals view the option of renovation. Generally, homes built prior to 1960 are perceived as being "solid" and well-built, but having inherent problems in terms of comfort and energy efficiency. Renovating these homes is seen as feasible, but expensive and complicated. Newer homes, particularly those built since 1980, are often seen as being of too poor a quality to justify major renovation.

3) When asked to consider future developments in housing, a very different set of factors emerged. Many of the expected changes cited would lead to a reduced negative environmental impact. While participants do not think of today's homes in terms of

environmental characteristics, they see such characteristics becoming increasingly important in the future.

The major surprise in the focus groups was the degree to which participants expect future changes in housing to be environmentally beneficial. In some cases, environmental concerns appear to prompt these desired changes; in other cases, these changes address conventional housing concerns, and environmental benefits are coincidental. These perceptions were offered unprompted, prior to any indication being given by the moderator that the sessions would focus on environmental matters. In general terms, the type of homes that participants expect to see in the future includes a broad array of environmental enhancements.

4) Participants see the move to more "environmentally friendly" homes as involving three main areas of change:

- **A move to smaller homes with more efficient use of interior space.** These homes would have less "dead space" than today's models, be more open, and require fewer materials for interior finishing. Increased "livability" and more functional layout are expected to offset the effects of reduced floor area.

- **A considerable reduction in the external negative environmental impact from homes.** Five key areas were consistently cited: reduced solid waste production, less energy use, less water use, more efficient and less destructive use of land, and less reliance on automotive transportation. Generally, reduction of the impact in these areas was considered feasible without requiring corresponding unacceptable impacts on lifestyle, comfort, convenience, and cost. The environmental impact associated with automobiles was seen as being among the most serious and the most difficult to rectify.

- **Increased emphasis on healthy and secure living environments.** Clean air and pure water would be assured by the use of new technology. In addition, greater use of active home-security systems is expected. Concerns also exist about toxic materials in homes, ranging from material off-gassing to cleaning and finishing chemicals.

5) There was a broad consensus among participants that future housing will deliver a reduced negative environmental impact; participants were far less certain about how these anticipated changes would affect lifestyles and the home environment.

All participants agreed that, in the future, housing will produce less environmental impact than it does today. However, there was far less agreement about what these changes would mean in terms of lifestyle or quality of life. Some participants were optimistic that comfort, choice and affordability would be unaffected. Other participants were fearful that homes would become more "sterile" and mechanical and that there would be less convenience in everyday life. These concerns appear to

be linked to two factors — fear that technology may erode traditional aspects of home life and a more general pessimism about our economic and social conditions.

6) The participants see "environmental-friendliness" as something that should be designed into a home, rather than added on.

Based on their descriptions of an environmental home, it was clear that participants view this concept as resulting from deliberate design choices, rather than as a conventional house with a number of add-on devices and systems. There was a clear sense that such a house would result from careful attention to both environmental factors and to the inhabitants' lifestyle wants and needs. There was strong resistance to any notion that environmental enhancements would be made at the cost of comfort or convenience to inhabitants.

7) Participants were more optimistic about reducing environmental impacts in cases where a technological solution can be identified. Where such a reduction would require significant lifestyle changes, the likelihood of change is seen as more doubtful.

Problems such as excessive energy or water use are seen as having straightforward technical remedies. Other issues, such as dependence on automobiles for transportation, are seen as requiring lifestyle change. These lifestyle issues are seen as being much harder to address.

8) Today's marketplace is not seen to offer the type of housing options that participants expect to see in the future. While they seem confident that such options will be forthcoming, they are less certain about how these things will evolve. Generally, they feel that the home building industry is somewhat out of touch with consumer perceptions, wants, and needs.

The participants recruited for these focus groups were selected because they share characteristics normally associated with those consumers who are among the first to react to changes and trends. Not surprisingly, most participants felt that the home building industry is somewhat "behind the times" in terms of home design, layout and amenities. The participants have a fairly clear view of how they believe housing is going to evolve in the future, but they do not see these directions reflected in the marketplace yet. They are aware of environmental enhancements that have been added on by home owners or are built only into top-end custom housing. In many ways, this group of consumers is waiting for the marketplace to catch up with them.

9) Participants viewed some specific changes in communities as consistent with their notion of housing directions. These changes relate to an increased sense of community and the needs of an aging population.

Changing concepts of community were repeatedly interwoven with discussion of environmental housing options, although the perceptions in this area were less consistent and detailed. The most common views involved increased emphasis on neighbourhoods: groups of homes located near common services such as shops and recreation facilities. Some participants suggested a move towards multi-unit residential developments that would share common green spaces. In general, there was a surprising level of interest in well-designed, high-quality multi-unit developments as one way to reduce the negative environmental impact while providing an improved sense of community. This direction was also seen as responding to the needs of an aging population, which wants luxury, a high level of services, and minimum maintenance obligations.

4.3 Conventional Factors That Influence Housing Choices

Although the environmental aspects of housing were the major focus of the research, during the Phase One sessions, some data was gathered on how conventional factors are influencing research participants. In general terms, these participants are at the middle to upper end of the economic ladder. As a group, they are informed and aware of the housing marketplace, involved in their communities, and able to articulate their thoughts and concerns with clarity. We generally categorize these consumers as "early adopters". The early-adopter buyer exerts a significant influence on housing trends.

As discussed in Section 2.0 of this report, one of the most important aspects of the housing marketplace is the way in which innovation and change take place. The home building industry generally follows, rather than leads these market trends. This is a sound strategy for a business sector that is traditionally under-capitalized and is, consequently, risk averse. "Early adopters" are among the first to demand changes in housing. Consequently, these are the consumers that the home building industry "follows" in terms of product evolution.

Five years ago, the research team conducted an extensive series of focus groups on housing issues in an attempt to understand more fully what early-adopter buyers wanted in new homes. The participants involved in that research were screened in a manner similar to that used for this project. This earlier data have been reviewed in an effort to place the current research findings in a comparative light. In a number of areas, some significant changes seem to be taking place.

There is a range of factors that influences individual housing choices. The most significant of these factors are financial capability and location preference. Specific trends in housing are also influenced by demographic factors and the ebb and flow of design trends. In seeking to understand the potential role of environmental criteria in housing choice, it is important to realize that such criteria work in tandem with these primary, more conventional factors.

The most significant of these are presented below.

- **The Move-up Mentality.** During our research conducted five years ago, it was clear that the "move-up mentality" was a major force among those with an established stake in the housing market. There was a clear, expansive trend towards larger, more luxurious homes that featured a range of upgraded amenities.

  Many of the participants taking part in the current research project had made this sort of housing move in the last few years. The perceptions that drive the move-up process were described by one participant in the Peterborough session in the following way:

  "The goal has always been to move up. Not that there was anything wrong with the places we lived, we just always thought there was another step."

During the recent sessions, it became clear that some redefinition of this move-up trend is taking shape. The desire for quality and livability seems to be gaining influence as participants reassess their housing needs. As one participant said, "Each time you hit a different stage in life, you change your mind about what's important."

- **The Size of Homes**. Five years ago, better meant bigger. Today, among those who have moved up to large homes, this view is changing. There is considerable interest in smaller homes that provide a high-quality environment, convenience, and security. Large homes are seen to require too much work, to tie up capital and to result in high taxes while not providing a living environment that is entirely satisfactory. This de-linking of the notion of quality from size is a significant change. While the bulk of participants are in their mid-30s to mid-40s, they are also aware that large homes will make less sense as children grow up and leave home.

- **The Concept of Community.** While not as consistently evident as the move away from the "bigger-is-better" mentality, participants seem drawn to the idea of more closely knit neighbourhoods and the increased human contact this could bring. This contrasts with the "cocooning" trend that accompanied the move to large, single-family homes. This renewed interest in neighbourhood can be seen in the surprisingly positive comments offered about multi-unit housing and row housing, types of housing that were decidedly unattractive to this sort of homebuyer only a few years ago. The is also an expectation that the availability of land for use in housing will be constrained by environmental concerns and that well-designed multi-unit "villages" might allow preservation of common green areas.

In addition to these more general changes in their view of housing preferences, participants have specific views on the type of prime features they see as appealing. Such prime features drive the trends affecting the housing industry and are subject to constant change and redefinition. While primarily design

elements, these prime features provide insight into the range of consumer "wants" that will affect the housing market over the coming years.

- Solid structure: the use of "real wood", more quality in finishes, hardwood floors are seen as a desirable premium feature.
- Design character: traditional exterior facade, treed lot, gardens, less "technological look".
- Open, well-designed interiors: less "dead space" in entrance ways, halls. Larger living rooms and kitchens, minimum of interior walls, fewer rooms. Homes designed in keeping with people's "real lifestyle". Lots of natural light.
- Sensible convenience features: main-floor laundry, adequate storage areas. More functional kitchen.
- Energy efficiency: high quality doors and windows; efficient heating systems; comfortable and healthy indoor environment.

5.0
PHASE TWO
RESEARCH SUMMARY

Phase Two of this project centred on developing information that would encourage housing consumers to consider the environmental impact of housing choices. The project's Scope of Work contained two main goals for this phase of activity:

1) *Development of comparative information that illustrates the variable level of environmental impact based on housing options; and*

2) *Development of methods for expressing this information so that it will have meaning for non-technical audiences.*

The research carried out during Phase One provided insight into how the environmental aspects of housing were viewed and understood by discussion participants. Phase Two activity centred on developing information and data to support further research with participants during Phase Three of the project.

In planning Phase Two, many of the findings from the focus groups were taken into account:

- Participants had exhibited a higher awareness of how the environment is affected by housing than was anticipated, but did not relate this to "here-and-now" decisions.

- Lack of knowledge seemed to be a significant barrier to any sort of comparative analysis on the part of participants; they were unsure of the quantitative nature of housing-related environmental impacts and of the degree to which specific measures and alternatives can reduce these impacts.

- Many of the expectations that participants had about future trends in housing were consistent with the technical framework for "environmental homes". Participants were familiar with the concept of such homes.

These factors were taken into account, and specific information was developed during Phase Two, centred in the following areas.

1) **The development of present-day, or "base-case" housing models that would provide participants with an understanding of the environmental and economic impacts resulting from typical home and lifestyle choices.**

2) **The development of "option packages" for both conventional and environmentally enhanced features that reflect the trends in housing anticipated by participants and some additional technological features identified by CMHC staff. These packages include detailed information about the approximate cost and environmental significance of each option.**

5.1 The Base-Case Models

Phase One research indicated that participants were able to discuss the conventional aspects of their present homes in detail because these are things they are familiar with and feel competent to analyze. While there was a solid awareness that homes have a range of environmental impacts and that future homes are likely to provide reduced negative environmental impacts, these concepts were understood only in general terms. In order to support more meaningful discussion about the value and desirability of future housing options, participants needed a greater quantitative understanding of how present homes affect the environment.

Three "base-case" homes were selected in order to illustrate the typical environmental performance of present housing options. These three included:

1) A suburban/rural detached home: newly built, 2,800 sq. ft., two-storey, electrically heated, occupied by a family of four.

2) An urban detached home: circa 1940, unrenovated, 2,000 sq. ft., two-storey, gas space and water heating, occupied by a family of four, located in a public transit service area.

3) An urban row or garden-home: newly built, 1,600 sq. ft., two-storey, gas space and water heating, with the same occupancy and transportation characteristics as case two.

Data was accumulated for each case in the following areas:

- Current average selling price of typical units in both Ottawa and Peterborough
- Annual energy consumption and end-use for gas and electrically-heated configurations assuming code construction and standard space and water heating equipment
- Annual water consumption and end-use for typical families of four
- Annual solid waste production for families of this size
- Transportation energy use and costs for commuting for the suburban/rural location
- A summary of the types of negative impact associated with these homes and the environmental significance of this impact; for instance, fuel use releases a range of pollutants that contribute to local air quality degradation, regional acidification and global atmospheric warming

Once data was accumulated, the research team developed appropriate methods for communicating this information to the participants. Emphasis was placed on the use of quantitative and graphic descriptions that were most likely to be meaningful to the participants.

5.2 The Option Packages

As outlined in Section 4.0, the plan for Phase Three research involved having participants select options for these three base homes. The Phase One findings had indicated that participants recognized three distinct types of housing characteristics that could be used to develop options. These were:

> **1) Environmental options** that primarily reduce environmental impacts.
>
> **2) Health and security options,** which would deliver specific health benefits or increase the occupant's sense of security and well-being.
>
> **3) Conventional options;** which would include the type of upgrade packages typically offered by home builders today; items such as higher quality finishes, premium fixtures and appliances.

In order to enable the participants to properly evaluate these options, they were provided with an information kit including:

- A full description of what the option includes, with appropriate technical explanations, as required
- The cost of the option and economic benefits, where applicable
- How the option affects the lifestyle and comfort of inhabitants
- How the option affects environmental impacts compared to the base-case homes

The following option packages were identified; final selection and specifications for each were developed in consultation with CMHC staff. A complete set of option information as well as the technical basis for each one is presented in Appendices "D" and "E".

Environmental Options for New Homes

- Energy-Efficient Building Envelope Options, including upgraded insulation, doors, windows, space and water heating system. It was decided to offer two levels of energy-efficient upgrade. The first of these would be termed "Better Energy Efficiency" and would approximate the thermal performance of a home built to the R-2000 Standard. A second level would be called "Best Energy Efficiency" and would provide further energy savings of 30 percent.

- Green Neighbourhood Option: this involved a smaller lot size and condominium status of all outside areas. A group of 12 homes would share a common park area enclosed by their homes.

- Efficient Design Package: this option involved a reduction in floor area for the newly built homes. This was accomplished by improved space efficiency, a more "open concept" floor plan, improved kitchen and bathroom design, flexible-use living areas, and the elimination of "dead space". The larger home was reduced in size by 400 sq. feet and the

row-house, by 200 sq. feet. This option provided a cost saving to the buyer, but the cost of the home was not reduced in proportion to the size reduction.

Environmental Options for All Homes

- Energy Efficient Appliance Packages: including refrigerator, dishwasher, washer, dryer, range and freezer. Again, it was decided to offer two levels of upgrade for appliances. The first level was called "More Energy Efficient Appliances" and represented equipment selected from among the top 10 percent of 1990 units listed under the EnerGuide program. The second upgrade level was called "Most Energy Efficient Appliances" and represented equipment that was the most efficient in the world; many of these units were incorporated in the Advanced House. Costs were calculated incrementally for the new homes on the assumption that these homes came equipped with appliances. They were fully costed for the older home.

- Water-Saver Package: this included water conserving toilets and shower heads. In the new homes, this option was costed incrementally.

- Information Centre Option: this incorporated aspects of SMART-house technology including computer-controlled heating and energy management and a facility for monitoring energy and water use in the home.

- Waste Reduction and Recycling Option: this included built-in recyclable storage, a garbage compactor, a backyard composter, and raised-bed garden area.

Health and Security Options for New Homes

- Fresh Air System: this included a central whole-house HRV system.

- Healthy Interior Option: this included hardwood flooring throughout the home, low-toxicity paints and finishes, solid wood cabinetwork and countertops.

Health and Security Options for all Homes

- Pure Water System: this provided a central water conditioning system plus a reverse osmosis unit for kitchen tap water.

- Security System: an active home security system in the medium price range.

Conventional Options for New Homes

- Kitchen Upgrade Package: designer cabinets and countertops, premium sink and fittings plus accent lighting.

- Bathroom Upgrade: spa-tub, shower stall, low-profile toilet, premium sink and fixtures.

- Flooring upgrade: hardwood flooring in living, dining and family rooms, premium carpeting in the rest of the house.

Renovation Options

- Limited Renovation: including replacement of all windows and doors, an energy-efficient heating system, repair of wiring and plumbing, attic insulation, and kitchen refurbishment.

- Extensive Renovation: same as previous package, with addition of high efficiency windows, insulation and air-sealing of exterior walls, remodeling of first floor, refinishing of floors and staircase, refurbishment of bathrooms, interior painting, and installation of basement laundry room.

6.0
PHASE THREE
RESULTS AND ANALYSIS

6.1 Context and Process

A quick review of the discussion process will provide context for the results of Phase Three activities.

This part of the project involved reassembling the participant groups for an additional two-hour discussion. Unlike the initial session, in which participants were provided no information, the Phase Three process was based on giving participants information similar to what might be included in a brochure or point-of-sale pamphlet. The manner in which they reacted to and integrated this information was the central focus of the session.

Conceptually, the discussion process was reasonably simple. Participants were presented with three houses — a newly constructed suburban detached home, an older urban detached home and a newly constructed urban row-house. For each, details of price, location and standard or existing features were provided, along with an artist's rendering. In each case, these details were consistent with current market "averages".

In addition, some environmental details were provided as "baseline" data. These included energy use, water use and solid waste production for each home, based on occupancy by a family of four. These values were presented in both standard units of measurement and in illustrative terms; for instance, water usage was expressed in litres per year rather than in cubic metres, and the total volume was compared to that needed to fill a large swimming pool. A simple breakdown of energy and water consumption by end-use was also provided. Phase One showed that individuals lacked the specific knowledge needed to make comparisons with confidence; this information was designed to empower decision making.

Following the presentation of the three homes, each home was addressed in more detail. For each, a package of options was presented. These ranged from very conventional items, such as upgraded flooring, to a range of environmentally oriented features. Included as options were reduced floor area and lot size. Presentation format was consistent for all options. Any environmental or lifestyle benefits associated with an option were identified. All options were costed as realistically as possible.

After discussion to ensure that participants understood each option package, they were given a purchase budget and asked to "assemble" the home they would want. In all cases, this budget was insufficient to allow all options to be selected, forcing trade-offs to be made. Options such as reduced floor area and lot size provided credits, which could be used to "buy" other upgrade options. This trade-off process was conducted individually to prevent participants from influencing one another's choices. The following pages provide a sample of the information presented to participants. The complete information package is presented in Appendix "D".

6.2 Key Findings and Analysis

1) There appear to be several specific criteria used to judge the desirability of the options presented to participants.

Participants clearly used a number of different criteria, or combinations of criteria, in evaluating options. The primary criteria appear to be

- Economic Benefits — options which provided a positive return on personal investment. Participants quickly determined the pay-back period for a given option and justified decisions on this basis. For example, energy-efficient upgrades of the home and appliances were viewed in terms of economic benefit.

- Health Benefits — some options were seen to address specific health concerns and were chosen on that basis. The "fresh air" package, which included a heat recovery ventilator, was seen to offer very direct health benefits. The cost of this option was not debated, nor was its inherent energy efficiency considered important.

- Social Responsibility — water conservation was seen as a socially responsible action. In Ottawa, this option offered a positive pay-back due to the City water rate billing structure. In Peterborough, water charges are not affected by the amount of water used, so there was no economic benefit to be gained. Yet the popularity of this option was the same in both centres. It should be noted that the cost of this option was fairly modest; therefore, the degree to which socially responsible motivation is price-sensitive is not known.

- Lifestyle Benefits — perceptions in relation to lifestyle are two-edged. If an option is seen to have a positive lifestyle benefit, its desirability is enhanced. The efficient design option was seen to address lifestyle concerns about poor interior layout and excessive waste space; these are the aspects that made this option attractive. Given these lifestyle benefits, the option's reduction in actual floor area was not viewed in negative terms.

  Options that meet other criteria still appear to be subject to a lifestyle "test"; if they are beneficial or neutral in relation to lifestyle, this enhances the option. If they detract from lifestyle, they are less likely to be selected. One example is water conservation: its lack of impact on lifestyle is a point in its favour. On the other hand, the green neighbourhood option, which conserves land, is inconsistent with the existing concept of land ownership.

  The concept of lifestyle as it affects consumer choice is both complex and subject to continual change and elaboration.

- Value for Money — An option that is appealing must also be perceived to offer value for money. As with lifestyle concerns, there is no precise way

to measure value for money. What an individual is willing to pay is directly linked to how much they want a particular thing. For instance, the waste reduction and recycling option was rejected by many participants on the basis of lack of value for money. They felt that they could acquire and instal this option's items themselves at a lower cost. In essence, they accepted the option, but rejected the terms of sale. Similar reasoning was applied to the "healthy" interior option. All participants agreed that this option was desirable, but many felt it was not worth the cost unless the purchaser suffered from the allergies that the option was expected to help relieve.

In the discussion sessions, each of these criteria was applied to options independently and all were factors in the choices made by participants. This provides some insight into the complexities surrounding choices made in the housing marketplace — there are many variables and the relative importance of each can change depending on particular circumstances.

2) Using the information presented, participants were confident when selecting options for the two new homes presented. It appears that participants see the case for environmentally improved new housing to be strong.

Participants had little difficulty sorting through and selecting options for the new homes. All appeared to follow a similar decision-making process. Their choices were generally consistent, and they were able to provide a rationale for each choice they made.

3) When presented with these available technologies and design enhancements as realistically defined and priced new-home options, participants consistently chose options that would deliver the most significant environmental benefits.

Overall, the range of new-home options selected by participants would achieve significant environmental benefits. Energy use would be lower than that required by the R-2000 Standard, appliances would be significantly more efficient, the home would be smaller in size and more thoughtfully designed, indoor air quality would be improved, and the home would use 40 percent less water. These options were selected by participants more frequently than were conventional features, such as upgraded flooring and kitchen improvements.

4) Participants had considerably more difficulty when it came to selecting options for the older home. While the options appeared to be well understood by participants, many appeared less certain about their choices. Participants view the case for environmentally-improved older housing to be less strong.

Participants were more hesitant when it came to selecting options for the older home. In Phase One, we found that individuals view the characteristics of older homes quite differently than those of new homes. Post-1960 housing is seen as being of poor quality and, for the most part,

unsuited to extensive renovation. Housing built prior to this period is seen as well-built and "solid", but there was concern that efforts to improve energy efficiency could easily undermine the integral character or "charm" of these homes.

There seem to be some underlying factors at work here. The first has to do with the way choices are made. With new homes, participants engaged directly in option comparison — the commitment to make a choice was not in question. With the older home, before participants engaged in the "what" choices involving options, they seemed to question "if" any degree of change was appropriate. Thus, the logic and rationale employed were more complex than in the case of the new homes. Given the abstract situation involved, they remained uncertain whether their overall approach to the older home was correct.

Participants seem to feel that a house "is what it is"; that either it is energy efficient or it is not, and that substantially changing the fundamental characteristics of a home after it is built can be a risky undertaking. In the case of the older home, this predisposition is reinforced by the perception that extensive and expensive renovation efforts threaten the good qualities of the home and may represent a poor investment, which do not proportionately increase resale value.

5) The new-home options most often selected also provide the most significant environmental benefits.

There was a high degree of consistency in the new-home choices made by both the Ottawa and Peterborough participants. In general, the pattern of selection divide into two clear segments as follows:

<u>Options Selected By More Than Two Thirds Of Participants</u>

- Energy-efficient appliances
- An energy-efficient building envelope
- Water conserving toilets and shower heads
- A more efficiently designed home with reduced floor area
- A whole-house ventilation system with heat recovery

<u>Options Selected By Fewer Than One Third Of Participants</u>

- Waste reduction and recycling option
- Kitchen upgrade
- Water purifier
- Information Centre (SMART features)
- Security system
- Bathroom upgrade
- "Healthy" interior option
- Flooring upgrade
- "Green Neighbourhood" (reduced lot size/shared land)

There were some common characteristics among those options most frequently selected. Most involved technology that participants either were familiar with or found easy to understand. All directly addressed some aspect of current housing performance that respondents recognize as falling short of what is desirable. All were viewed as being consistent with the participants' lifestyle.

6) Individuals relate local and personal concerns and conditions to the choices they make. The desirability of some environmental features will vary, depending on the extent to which a particular environmental problem is of local or personal significance.

Previous research by the consultants into public awareness and attitudes on the environment indicated a strong relationship between awareness of issues and local conditions. Industrial pollution is a more important issue in industrialized areas; forestry issues are more important where the forests are harvested. During this project, aspects of this relationship surfaced in an unexpected, but interesting manner.

While solid waste management is a broadly recognized issue, this problem is particularly severe in the City of Peterborough. Local landfill sites are nearing the end of their lifespan, and no suitable alternative sites have been found. This situation has led the city to adopt a user-pay system for household garbage collection. Households are allowed to put out only one bag of garbage per week. A second bag results in a $1.50 surcharge, a third bag costs an additional $3.00. This approach has made solid waste reduction a matter of significant interest in the area, and this interest was reflected in the participants' reaction to the waste reduction and recycling option. In Ottawa, this option was virtually ignored; in Peterborough, it was selected by the majority of participants. The environmental features acceptable in one market may well be different than those acceptable in another market.

This degree of difference was uncharacteristic; as stated earlier, in most other respects, the thinking of two groups was quite similar.

7) Ownership of land remains a key part of home ownership. New community concepts that involve collective land ownership were acceptable to a small portion of the participants.

During Phase One discussions, participants identified the impact of housing on land as a major environmental concern. In response, an option called "Green Neighbourhood" was developed. This set homes on smaller lots and treated all land areas as common property, creating a large, private park shared by a number of individual homes. This type of development has been carried out in other countries and, in a more limited way, in Canada. This option was presented as reducing the cost of the home slightly.

Based on the earlier discussions, it was expected that this option would be well received. It was not. With the detached new home, it was the

least popular option; with the attached home, about one third of participants made this choice. In follow-up discussion, it became apparent that, while the option addressed certain environmental concerns, it ran headlong into more fundamental perceptions of land ownership. In spite of the small size of most new-home lots, land ownership has enormous meaning to people. The concept of ownership of the home without some adjoining land made participants quite uncomfortable.

This discomfort was somewhat reduced with the attached home; the "style" of living was seen by some as already involving shared property. Still, two-thirds of the participants still chose owned land with this home.

While participants explained their choice in terms of not wanting to deal with the "problems" of shared land or needing to know that they could control the property surrounding their home, land ownership would seem to have both real and symbolic value. This symbolic value may, in the final analysis, be the more important of the two.

It should also be noted that this option included both a reduction in land area adjoining the home and community ownership of this land. In discussion, it became clear that these were two quite separate concepts for the participants. Development of options focused on one or the other concept might have produced somewhat different results.

8) The quality of information provided to individuals on various housing options will directly affect their ability to assess the value and acceptability of that option. Lack of information creates a barrier to choice.

While somewhat obvious, this point needs to be made explicitly. During the Phase Three sessions, participants did not hesitate to make choices involving the new homes presented. In fact, the ease with which they were able to compare and assess the options was quite remarkable.

In contrast, they remained less certain of their choices in relation to the older home.

These individuals experienced difficulty in developing a precise definition of the cost or characteristics of such options during Phase One. Once provided with consistent information on a wide range of options, they were, in the case of the new homes, fully able to make very clear choices. For the older home, lack of knowledge in relation to the renovation process itself remained a barrier.

9) In order for participants to actively consider environmental features, these features must be presented as available "here and now" options.

During Phase One discussions, it was clear that participants tended to think of environmental features as futuristic. This reflects the way these

options are most commonly presented, as something that "will be available" or "will be common someday". Environmental features need to be seen as "here and now" to be seriously considered.

10) There is an expectation that changes in housing design and technology will take place in an evolutionary manner. It is expected that those things that need to change, will change; but that features that are beneficial or valued will be maintained.

Participants do not view environmentally improved homes as a new type of home, but simply as an improvement in what is built today. This was evident during the Phase One discussion, when participants described their concept of what such a home might look like — there was a clear preference for very traditional exteriors with Victorian or Colonial influences.

It is worth remembering that people live in homes, not in concepts. The participants tended to see housing choices as a series of decision steps. Location and price are the first of these steps. Curb appeal, interior layout and conventional amenities follow. The majority of the environmental features accepted by participants also can, potentially, become steps in this process. While these features may well gain currency in the marketplace, they will not displace other steps, but be in addition to them.

7.0
CONCLUSIONS

1) Based on the results of this research project, it seems clear that a latent market for environmentally improved new housing is developing. Consumers appear willing to invest in environmental housing features.

This research project found that consumers are willing, if not anxious, to accept a range of housing features that would offer significant environmental benefits to occupants and the common environment.

2) Research shows that substantial environmental gains can be made in new housing by the application of existing technologies.

The technology needed to significantly reduce energy and water use in new homes is well developed and commercially available. Other issues, such as more efficient design and material use, are largely non-technical. The overall cost of incorporating these features in new homes would likely be quite low.

3) Participants evaluate housing options based on a number of criteria — economic benefits, health benefits, social responsibilities, lifestyle needs and value for money are principal criteria. Those options selected were judged to satisfy one or more of these criteria and to not have a negative impact on others. Participants expect environmental features to add to, not subtract from, the overall appeal of a home.

4) The introduction of environmental features into the home renovation market appears much more problematic than for new construction.

This project did not find the same clear direction for older homes as was found for new homes. Participants were unsure of the correct approach to renovating older homes. There was concern about compromising the basic qualities of the home in an effort to make it technologically "modern". As well, issues related to the economics of renovation were raised. Would investments made to substantially improve the environmental performance of an older home be reflected in resale value? Having no ready answers to such questions, participants were reluctant to commit themselves to options.

5) Lack of consumer knowledge about environmental housing options is a significant barrier to change. Promotion of these options to consumers will require effective and substantive communications. Consumers have a broad, general knowledge of the linkages between housing and the environment, but lack the detailed knowledge necessary to confidently select environmental features when choosing a home.

Consumers respond to product options for which they have a confident understanding. At this time, consumers do not consider the "Environmental House" as a discrete product, but as a general concept presumed to involve a range of unfamiliar technological innovations. It appears likely that environmentally improved housing could achieve market positioning as a specific, defined product category. This would require focused and effective consumer education.

6) Consumer information that positioned environmental housing options as being available "here and now" could accelerate the adoption of such features. Consumer awareness of, and demand for, such features would stimulate commercialization by builders.

Given the risk-averse nature of the home building industry, it is unrealistic to assume broad adoption of environmental features by builders in the absence of clear consumer demand. Adoption of these innovations by the home building industry can best be facilitated by stimulating such demand. Consumer information and education offer the best vehicle for achieving this.

7) Participants indicated a high level of interest in seeing and examining an "environmental home" similar to the one identified in the sessions. Environmental housing demonstration initiatives should recognize that consumers do not separate environmental features from other, more conventional aspects of the home. As a result, demonstration initiatives need to address the full range of consumer housing wants and needs. An environmental house that fails to satisfy other housing criteria, such as quality of construction, curb-appeal and lifestyle amenity needs, will not be accepted by consumers.

8) It is possible that consumers will assume that the environmental features appearing in the marketplace are not affordable. Public information and education will need to consider how to prevent consumers from having unrealistically high price perceptions.

Technical innovation in housing has tended to occur first in custom construction and renovation. As a result, there is tendency for consumers to assume that such new technology is expensive and somewhat exclusive in application. It seems that many environmental features can be incorporated into housing at low incremental cost. This needs to be effectively communicated.

APPENDIX A

SUMMARY OF IMPACT OF CONSUMER HOUSING CHOICES ON ENVIRONMENTAL PERFORMANCE

APPENDIX 'A'

SUMMARY OF THE IMPACT OF CONSUMER HOUSING CHOICES ON ENVIRONMENTAL PERFORMANCE

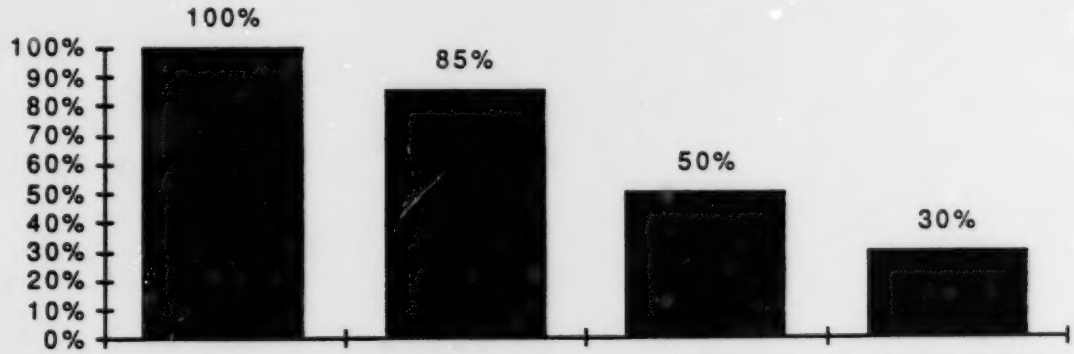
The participants in this research project demonstrated a strong interest in housing options that could significantly reduce energy and water use in the home. Of less interest were options designed to reduce solid waste production; participants were inclined to obtain solid waste reduction features independently rather than purchase them from the builder.

The following graphs illustrate the range of environmental improvements that can be achieved if the technology and design approaches tested in the project were taken up by home builders and consumers. These data result from secondary research and offer guidance to the costs and benefits of various technologies and design approaches.

The graphs are based on the suburban detached home model used in the research. This home has a floor area of 2,800 sq. ft. and is all electric. Assumed occupancy is by a family of four. In its "conventional" form, the home conforms with the 1978 Measures For Energy Conservation. The cost impact of various options is shown relative to the initial selling price of this conventionally constructed unit. Note that some of the options result in a decrease in the cost of the home. Bear in mind that if such options were to be offered by builders, the selling price would be determined by market forces; strong consumer demand would likely result in higher prices.

A complete description of the technologies included in these examples can be found in Appendices "D" and "E".

Annual Energy Use

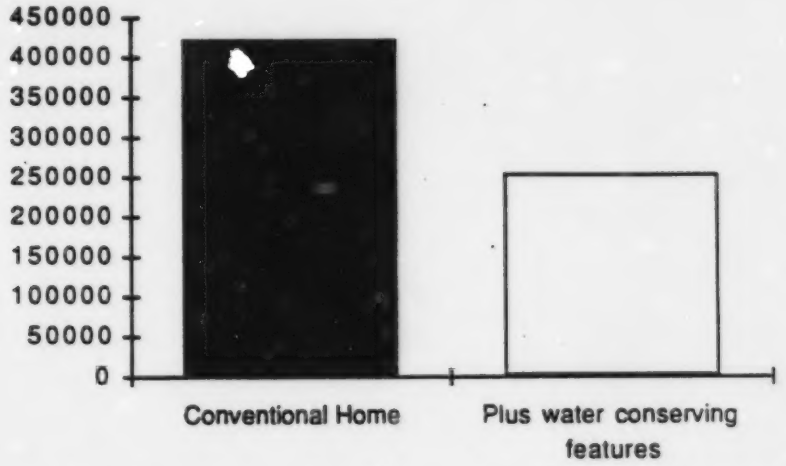


	CONVENTIONAL HOME	PLUS FEATURES	PLUS BETTER ENERGY EFFICIENCY	PLUS BEST ENERGY EFFICIENCY
Energy Use	40,000 kwh/yr	33,000 kwh/yr	20,500 kwh/yr	11,500 kwh/yr
Impact on Home Cost	n/a	-4.2%	- 2.1%	+.92%
Annual $ Savings	n/a	$375.	$1,100.	$1,600.

"Plus Features" includes most energy efficient appliances, water saver option and efficient design package

Water Usage (Litres/yr.)

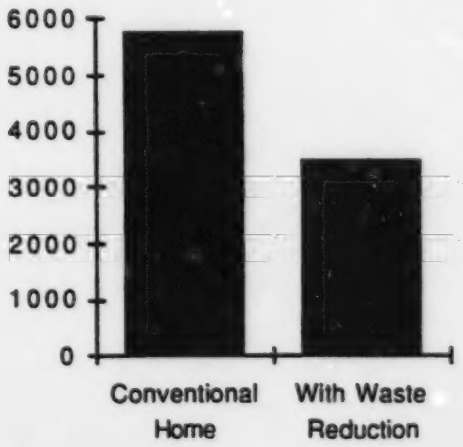
Research participants consistently selected water-conserving options. The specific options offered included water-conserving shower-heads and low-flush toilets; the graph below illustrates the degree of water use reduction available with these devices. Related hot-water energy savings are incorporated in the annual energy-use graph.



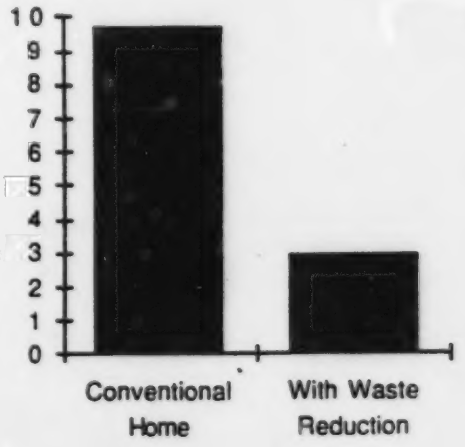
Solid Waste Generation

Reduction in the mass and volume of solid waste generated by a household cannot be solely addressed by technology; householder participation is required. Research participants expressed interest in two technical options: backyard composters and waste compactors. Composters can assist in significantly reducing solid waste mass; compactors can reduce remaining volume. Ongoing consumer selection of products offering reduced enviromental impacts could provide solid waste reductions additional to those listed below.

Mass - Lbs./yr



Volume - Cu. yds/yr



APPENDIX B

FOCUS GROUP RECRUITMENT SCREENING

Appendix "B"
FOCUS GROUP RECRUITMENT SCREENING

The qualitative research approach selected for this project required the recruitment of *Early Adopter* consumers with an active interest in housing. The following screening process was used when recruiting participants

General Screening Guidelines

- Participants must be able to attend both scheduled focus group sessions.
- Each participant must be looking to upgrade their current home by either making at least $25,000 worth of renovations or moving to another home within the next 24 months.
- Sex: 6 male, 6 female
- Age: 25 up
- Language: able to converse in English
- Education: some post-secondary education
- Occupation: maximum 4 participants who work for the federal government

Exclusion Screens

- Cannot work in marketing, market research or for the media.
- A participant or their immediate family cannot work in the housing industry, for a utility company, for a municipal government or Energy, Mines and Resources Canada, be an elected public official or be active in an environmental organization.
- There must be at least one adult in the household employed full-time.
- A participant must not have attended a focus group discussion in the past 9 months.
- A participant must agree with 8 out of 11 of the following statements:

"I am going to read you some statements which you may or may not feel are true about you. Please tell me if you agree or disagree with each statement"

I am active in my community.
I prefer to get my information about current events from reading the newspaper rather than just watching T.V.
People often turn to me for advice.
I read at least one newspaper a day.
I like to try new products.
I read the editorial section of my newspaper most days.
I like to think I am a good listener.
I almost always have at least one book that I am reading.
I often discuss current events with my neighbours and friends.
I belong to at least one business club, service club or social club.
I don't mind giving my opinion, even if it differs from those around me.

APPENDIX C

PHASE ONE FINDINGS

EXPECTED TRENDS IN HOUSING

Appendix "C"
PHASE ONE FINDINGS

EXPECTED TRENDS IN HOUSING

General Trends in Housing

Participants were asked to describe how homes might change over the next 10 to 15 years. The use of this "futuristic" context is a research device that helps to overcome an individual's reluctance to state opinions when they feel lack of information or knowledge might lead them to an incorrect conclusion. In interpreting these results, it can safely be assumed that the comments offered apply to the individuals' current views on housing and the range of options they would like to see in the marketplace. The following opinions were provided verbally and as part of a written exercise. Results from both focus groups were fairly consistent. Note that the moderator had not introduced the topic of "environment" prior to this exercise and that no discussion of environmental aspects of housing took place prior to these trends being identified by participants. Expected trends are presented in general categories and divided in terms of perceived positive and negative value.

What will these homes look like? In what ways might these homes be different to live in?

Positive changes

- A return to "traditional" exterior features (Victorian and Colonial facade)
- Generally smaller homes, reduced floor area offset by more efficient interior layout
- More "ergonomically" designed interior, more functional, easier to live in
- More natural interior light, fewer interior walls, more flexible space suited to different uses
- Higher density housing, smaller lots, less land usage
- New concepts in high density housing, row houses that are attractive and "upscale"
- High density "villages" with common green space and lots of trees and gardens
- Low-maintenance construction
- Increased use of home workstations
- Quieter and more soundproof construction
- More homes geared to seniors; bungalows and senior condominium communities
- Greater incidence of multi-generational families and multi-family households for economic reasons
- Greater emphasis on health and security in the home:
- More "built-in" features, appliances, recycling facilities

Negative changes

- More "sterility" in home design; less variety and uniqueness
- Homes becoming more cramped and "mass-produced"
- Less privacy, less of a child-orientation in communities

What new technologies might be built into these homes?

Positive changes

- Generally more "environmentally friendly"
- Greater use of solar heating
- Overall increase in energy efficiency in all aspects of home operations
- Possible use of district heating in high-density housing projects
- Computer control of home operating systems, SMART-house features
- Solid waste systems, recycling systems, and garbage compactors
- High-efficiency heating and cooling systems
- Switch to synthetics/plastics to replace wood
- Filtered fresh air systems, central water purification
- General use of water conserving devices
- Increased use of active home security systems
- More in-home entertainment systems

Negative changes

- Use of computers may make home too "machine-like"

How might communities be different to live in then, compared to now?

Positive changes

- Homes located closer to work centres
- More reliance on public transit
- Development of "village concept", smaller communities with centralized services
- Return to more closely knit neighbourhoods; increased sense of community
- Greater recreational orientation in new communities

Negative changes

- Home ownership will become more difficult for young families to achieve
- Secure communities will be needed to keep outsiders away
- More than one family will have to share a home for economic reasons

Environmental Housing Concepts

After a detailed discussion of how housing affects the environment and how the negative impact might be reduced, participants were asked to write a description of what an "environmental house" might be like. A subset of questions was provided to focus their comments. As might be expected, given the strong environmental focus that emerged in the earlier exercise, these comments were largely elaborations of already identified trends. Some of the more significant comments are presented under the topic questions provided in this exercise.

How will these (environmental) homes differ from those we live in today?

- Smaller, more compact and efficient, well-planned space
- Much more energy efficient, more solar heating, less fossil fuel use
- More filtering/purification of indoor air and water
- More use of synthetic materials
- Recycling systems/bins will be part of house
- These homes will be more self-sufficient
- Less wasted space than today's homes
- More natural light
- Comfortable and adaptable so we will not need to move so often
- Services and stores located nearby
- Healthier, built of safer materials
- Smarter
- Closer to public transit and work centres
- They will produce less solid waste, more composting
- Smaller lots, less land used
- More automated, more information to inhabitants about energy/water used

In what ways will these homes be better for the environment?

- Less energy consuming, less air pollution
- Less water consuming, less water pollution
- Require fewer materials to build, less wood used
- They will require less land. Housing won't be as destructive to the land and nature
- They may involve the use of mini- sewage plants to reduce pollution
- People will be more aware of how to protect the environment everyday
- People will be more conscious about what they buy and use
- Less solid waste going to landfill sites
- Homes will be located nearer to places of work; less transportation
- Homes will be more durable and easier to maintain and upgrade

How will these homes compare to our present homes in terms of comfort and affordability?

- Less comfortable and less affordable
- They will be very convenient to live in
- They will remain comfortable but we will also learn to adapt to any changes
- They will be the norm so affordability will not be an issue
- Fewer people will be able to buy a home because of general economic trends, not house price
- The increase in cost will be modest because of mass-production
- Increased price will be offset by lower operating costs
- Government will have to subsidize developers in order to keep costs down
- Starter homes will be more affordable but very basic
- Improved layouts will mean increased comfort
- We will adapt. Over time, our past lifestyle will seem wasteful and excessive
- Comparable cost and increased comfort

How will our lifestyles be different when we live in these homes?

- Our attitudes will change, we'll conform
- We will be more aware of our impact on the environment
- Our lifestyle will be healthier
- Our lifestyle will not change
- We'll become more self-sufficient, actively controlling our home environment
- Our values will change
- We will become less dependent on cars
- We'll become less mindless about consuming and more interested in information and communications
- We will be required to take more responsibility for the things we do
- Life will become less convenient, more effort will be required on our part
- Our lives will be more controlled, but we will know that we are protecting the environment
- We will become conditioned to use fewer materials
- Our lifestyle will become more relaxed and less guilt-ridden

APPENDIX D

PHASE TWO DATA SOURCES

APPENDIX "D"
PHASE TWO DATA SOURCES

Data accumulated and developed during Phase Two came from the following sources:

1) Base-Case Homes

- Price data was based on 1990 LePage survey data for both Ottawa and Peterborough. Pricing was then verified with area realtors.
- Energy consumption was based on 1978 Measures for Energy Conservation requirements which were assumed to represent the current market average for newly constructed homes. The older home was modeled manually based on common characteristics of homes built in the 1940s. Climate data was for Ottawa. Calculations were carried out by CANMET staff using a modified version of HOT 2000, which also provided the division of energy by end-use.

Energy End-Use	New Detached 2,800 sq ft	Older Detached 2,000 sq ft	New Attached 1,600 sq ft
Space Heating			
— Electric	90 GJ/yr	140 GJ/yr	50 GJ/yr
— Gas	150 GJ/yr	233 GJ/yr	83 GJ/yr
Water Heating			
— Electric	17 GJ/yr	17 GJ/yr	17 GJ/yr
— Gas	38 GJ/yr	38 GJ/yr	38 GJ/yr
Lights/Appliances	34 GJ/yr	30 GJ/yr	28 GJ/yr

The assistance of CANMET in developing this data is gratefully appreciated.

- Energy costs were calculated based on blended first-quarter rates for both Ottawa and Peterborough.
- Estimated water consumption for a family of four and the division of water consumption by end-use was provided by the Inland Waters Directorate of Environment Canada.
- Estimates for the volume of solid waste produced by a family of four were taken from Environment Canada's Green Plan.

2) Appliance Option Packages

- The "More Efficient" option represents the efficiency difference between appliances that rated within the bottom 10 percent of energy use and those with mid-range energy performance as listed in the 1990 EnerGuide. Energy savings were calculated based on current Ottawa Hydro rates. The incremental cost of this option was based on the cost difference between those appliance models selected. In all cases, the size and basic features of the appliances being compared were similar.

- The "Most Efficient" option represents the additional efficiency gains available if appliances similar to those in the Advanced House were used. The costing for this option was more complex because some of the technology is currently prototypical, while other items are only available as specialized imports. The incremental cost cited represents the consultant's judgment of what these appliances would have to retail for in order to be commercially viable.

3) Green Neighbourhood Option

- The concept used in this option is based on existing condominium practice in some areas of the U.S. and Canada. One such development is a 45-unit R-2000 row house project located in White Rock, B.C. The cost reduction cited for the option are considerably understated in order to more strenuously test other aspects of the concept. Actual cost reductions would be nearly double those cited.

4) Pure Water System

- This system is available from Culligan Inc. and consists of a central waster conditioner (salt based) and reverse osmosis filter on the kitchen faucet.

5) Information Centre

- This option includes some SMART house technology and anticipates the use of load-shedding sensors to reduce peak electrical demand. Such a system does not presently exist as configured but all of the components required are either commercially available or in use as pre-commercial prototypes. The costing for this option was developed in discussion with Mr. Bob Sloat of the Canadian Home Builders' Association. Mr. Sloat has studied the development of SMART house systems by the N.H.B.A.

6) Water Saver Package

- This option is based on the use of toilets requiring 7.5 litres of water per flush and water-conserving shower heads meeting the CSA Standard referenced under the EcoLogo Program. Costing is based on averages for currently-available equipment meeting these criteria.

- Cost savings cited are based on current City of Ottawa tariffs for water usage by residential customers. These saving include a nominal credit of $25. per year for energy savings related to reduced hot water use. The City of Peterborough does not levy water charges based on volume, so only energy-related savings were allowed in the Peterborough material.

7) Waste Reduction and Recycling

- The waste compactor cited is available through Sears at a regular selling price of $605. The backyard composter is the common "Green Cone" produced by Rubbermaid Industries which retails for about $50. The remaining cost was attributed to the cabinetwork and garden preparation work.

8) Active Home Security System

- This represents a medium-priced commercial installation in the Ottawa area. Costing was based on quotes received by commercial suppliers.

9) Efficient Design Package

- This option was based on a number of factors. The question of where "dead space" existed in the home and what type of design improvements were needed was answered by participants in Phase One discussions. As well, discussion with CHBA staff indicated that the proportion of floor space used for entrance areas and hallways increases substantially in homes with a total floor area of more than 2,000 sq. feet. As a result, it was decided to reduce floor area in the larger, detached home by about 15 percent but to limit the reduction in the smaller, attached home to about 12 percent.

- The cost reduction provided by this down-sizing was not made proportionate to the reduction in floor area. In the case of the larger house the reduction in price was only 33 percent of the reduction in area. For the row house the reduction was equal to 40 percent of the space loss. This approach was taken to more rigorously test the non-economic aspects of this option. As well, this option was quite deliberately positioned as an "upgrade" not as a "downgrade", it was felt that it should be costed in a manner consistent with this positioning.

10) Energy Efficiency Packages

- The "Better Energy Efficiency" option approximates the envelope performance of a home built to the R-2000 Standard and assumes a 30 percent decrease in energy requirement compared to the base home. The home would involve relatively conventional construction with additional wall, ceiling and foundation insulation, good quality thermopane windows and an efficient heating system. The cost of this option is based on 2 percent of the base price, a figure in line with the incremental cost of an R-2000 upgrade as reported by builders surveyed (H. Meyer Const., Surrey, B.C.; Seargeant-Picard, Thunder Bay, Ont.). Note that the heat recovery ventilation system was offered as a separate option and the cost of this system is not assumed in the 2 percent increment.

- The "Best Energy Efficiency" option is more conjectural. In part, it reflects the range of energy efficiency gains demonstrated by the Advanced House. Some differences should, however, be noted. Rather than assuming commercialization of the integrated heat system in the Advanced House, this option was assumed to use a "CoolFire" gas-assisted heat pump, a currently commercial technology. Windows were assumed be upgraded to inert-gas filled, low-E units from conventional thermopane. Appliances and ventilation were not considered as these were offered separately.

11) Health Interior Option

- This option was not envisioned as catering to the chemically-sensitive but rather to the health conscious. Items included addressed some of the more common sources of off-gassing and dust and mould accumulation. Costs were based on current upgrade pricing for such items by Clayton Developments of Halifax, Nova Scotia. Clayton is the largest builder of new homes in the Maritime provinces.

12) Kitchen Upgrade

- Package upgrade offered by Clayton Developments adjusted for house size.

13) Bathroom Upgrade

- Package upgrade offered by Clayton Developments adjusted for house size.

14) Flooring Upgrade

- Package upgrade offered by Clayton Developments adjusted for house size.

15) Fresh Air System

- Estimated incremental cost of heat recovery ventilation system in accordance with R-2000 Standard of 0.5 ACH.

16) Renovation Options

- Development of the two renovation options was somewhat more problematic than for the new home upgrades. Initial discussions were held with Oliver Drerup of Drerup-Armstrong Construction to identify the "typical" approaches taken to renovating this type of home. Clearly, building condition can lead to considerable variability in actual costs. The two options represent reasonable averages from a number of perspectives.

The measures selected for each option include the mixture of alterations most commonly undertaken for projects of their scale. Individuals renovating a home tend to address both technical upgrade requirements and lifestyle needs when undertaking projects. Replacement of heating equipment, windows and doors offer the greatest incremental energy savings. For the lower cost renovation, energy savings of 28 percent are assumed, the result mostly from heating system efficiency gains.

For the more extensive renovation, which included exterior insulation and air sealing, energy savings are assumed to increase to 40 percent.

APPENDIX E

DOCUMENTATION

Ottawa

SUBURBAN/RURAL DETACHED

FEATURES

- newly built
- 2,800 sq. ft.
- two-storey
- three bedrooms + optional den
- 2 1/2 baths, incl. master ensuite
- livingroom, separate dining room
- kitchen with eat-in area
- main-floor laundry
- attached double garage
- annual energy costs: $2,410
- selling price: $245,000

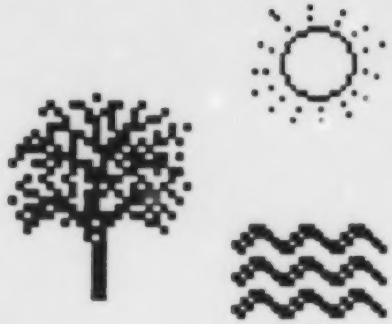
PURCHASE BUDGET: $260,000
BASE PRICE: $245,000

OPTION PACKAGES	COST	SELECTED	COMMENTS
MORE ENERGY-EFFICIENT APPLIANCES	$400		
MOST ENERGY-EFFICIENT APPLIANCES	$900		
GREEN NEIGHBOURHOOD	(-$3,500)		
PURE WATER SYSTEM	$2,750		
INFORMATION CENTRE	$3,500		
WATER-SAVER PACKAGE	$850		
WASTE REDUCTION/RECYCLING	$1,325		
ACTIVE HOME SECURITY	$900		
EFFICIENT DESIGN	(-$12,000)		
BETTER ENERGY EFFICIENCY	$4,900		
BEST ENERGY EFFICIENCY	$12,500		
HEALTHY INTERIOR	$9,600		
KITCHEN UPGRADE	$4,000		
BATHROOM UPGRADE	$3,100		
FLOORING UPGRADE	$4,200		
FRESH AIR SYSTEM	$3,000		
TOTAL		$	

(Ottawa)

SUBURBAN/RURAL DETACHED

HOW THIS HOME AFFECTS THE ENVIRONMENT



Each year this home:

- consumes enough energy to drive the average car 41,000 km
  - 173,000 cubic feet of natural gas plus 9,444 kwh of electricity
    or
  - 39,165 kwh of electricity if it is all-electric
- uses enough water to fill a 20 x 30 ft. swimming pool over 7 ft. deep
  - 420,000 litres of fresh water
- produces garbage equal to the weight of two cars
  - 9.7 cubic yards of garbage weighing 5,780 pounds

The results:

- depletion of fresh water resources and additional water and sewage treatment costs
- increased demand for electricity and additional generating plants
- air pollution and depletion of non-renewable energy resources
- the need for additional solid waste disposal and its associated pollution

How energy is used:

space heating	64%
water heating	12%
lighting/appliances	24%

How water is used:

toilets	45%
bathing	28%
laundry/dishes	23%
drinking/cooking	4%

MORE ENERGY-EFFICIENT APPLIANCES

- ENERGY-EFFICIENT DISHWASHER, WASHER, DRYER, RANGE, FREEZER, REFRIGERATOR

ENVIRONMENTAL BENEFITS

- reduces energy use by 15%
- reduces need for new electrical plants

COMFORT/LIFESTYLE

- same function and convenience

COST: $400

ENERGY SAVINGS: $57/YEAR

1

MOST ENERGY-EFFICIENT APPLIANCES

- STATE-OF-THE-ART DISHWASHER, WASHER, DRYER, RANGE, FREEZER, REFRIGERATOR

ENVIRONMENTAL BENEFITS

- reduces energy use by 48%
- reduces need for new electrical plants

COMFORT/LIFESTYLE

- same function and convenience

COST: $900

ENERGY SAVINGS: $182/YEAR

2

GREEN NEIGHBOURHOOD

- HOMES SET ON SMALLER LOTS, REDUCED FRONT SETBACK
- PRIVATE DECK AREA IN BACK
- COMMON-USE "GREEN COURT" IN PLACE OF BACK YARD

ENVIRONMENTAL BENEFITS

- 15% less land used

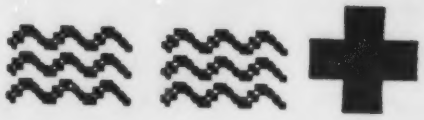
COMFORT/LIFESTYLE

- twelve homes share private "green court" area
- shared land maintenance
- private deck for outdoor cooking, entertaining, etc.

COST REDUCTION: $3,500

PURE WATER SYSTEM

- PURIFIED, FILTERED WATER FROM ALL FAUCETS
- CHEMICALS AND BACTERIA REMOVED FROM TAP WATER



ENVIRONMENTAL BENEFITS

- removes common chemicals from all tap-water services
- filters bacteria and odour out
- more efficient than small tap units

COMFORT/LIFESTYLE

- clean, clear drinking water
- one central unit eliminates individual filters

COST: $2,750

INFORMATION CENTRE

- HOME PERFORMANCE MONITOR
- ELECTRICAL MANAGER
- CONTROL CENTRE FOR HEAT AND LIGHTS

ENVIRONMENTAL BENEFITS

- reduces peak electrical load
- reduces utility pollution
- allows efficient use of home heating and lighting systems

COMFORT/LIFESTYLE

- helps you control energy and water use in your home
- helps you control utility costs
- provides heat and light control, even in your absence

COST: $3,500

WATER-SAVER PACKAGE

- WATER-EFFICIENT SHOWERS AND TOILETS

ENVIRONMENTAL BENEFITS

- reduces water use by 40%
- saves 168,000 litres per year
- conserves fresh-water supplies
- reduces water pollution

COMFORT/LIFESTYLE

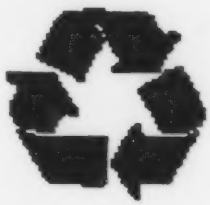
- same function and convenience
- helps keep municipal costs down

COST: $850

SAVE: $230/YEAR

WASTE REDUCTION & RECYCLING

- BUILT-IN RECYCLABLE MATERIALS STORAGE
- BUILT-IN WASTE COMPACTOR
- BACKYARD COMPOST UNIT
- RAISED-BED GARDEN



ENVIRONMENTAL BENEFITS

- lets you compost all food wastes; garden uses composted wastes
- reduces household garbage sent to landfill

COMFORT/LIFESTYLE

- reduces waste clutter
- keeps garbage compact
- provides garden for recreational use

COST: $1,325

ACTIVE HOME SECURITY SYSTEM

- INTRUSION ALARMS ON ALL DOORS AND WINDOWS
- ELECTRONIC POLICE ALERT HOOK-UP

ENVIRONMENTAL BENEFITS

- not applicable

COMFORT/LIFESTYLE

- home security when you are at home or away

COST: $900 + $30/MONTH

EFFICIENT DESIGN PACKAGE

- EFFECTIVE USE OF INTERIOR AREAS
- MINIMUM "DEAD SPACE"
- OPEN-CONCEPT LOWER LEVEL AREAS
- SPACE-EFFICIENT BATHROOMS AND LAUNDRY
- LOWER LEVEL "WATER CLOSET"
- FLOOR AREA OF 2,400 SQ. FT.

ENVIRONMENTAL BENEFITS

- less materials used
- lower energy use

COMFORT/LIFESTYLE

- maximum useable space
- more open, flexible living areas
- same features and convenience

COST REDUCTION: $12,000 ENERGY SAVINGS: $168/YEAR

BETTER ENERGY EFFICIENCY

- BETTER DOORS, WINDOWS
- EXTRA INSULATION AND AIR SEALING
- HIGH-EFFICIENCY WATER HEATER

ENVIRONMENTAL BENEFITS

- reduces energy use by 30%
- less carbon dioxide; less need for new electrical plants

COMFORT/LIFESTYLE

- draft-free
- even temperatures
- cooler in summer
- less noise

COST: $4,900

ENERGY SAVINGS: $723/YEAR

14

BEST ENERGY EFFICIENCY

- STATE-OF-THE-ART DOORS AND WINDOWS
- EXTRA INSULATION AND AIR SEALING
- SUPER-EFFICIENT GAS/ELECTRIC HEAT PUMP
- HIGH-EFFICIENCY LIGHTING

ENVIRONMENTAL BENEFITS

- reduces energy use by 52%
- less carbon dioxide, or less need for new electrical plants

COMFORT/LIFESTYLE

- draft-free
- even temperatures
- cooler in summer
- less noise

COST: $12,500

ENERGY SAVINGS: $1,247/YEAR

16

HEALTHY INTERIOR

- HARDWOOD FLOORS IN ALL ROOMS EXCEPT KITCHEN AND BATHROOMS
- LOW-TOXICITY PAINTS AND FINISHES
- SOLID WOOD CABINETRY AND COUNTERTOPS
- MINIMUM USE OF SYNTHETIC MATERIALS

ENVIRONMENTAL BENEFITS

- less chemical pollution of indoor air
- less use of environmentally destructive materials

COMFORT/LIFESTYLE

- healthier air
- less allergy-producing interior

COST: $9,600

Flooring and kitchen upgrades NOT available in combination with this option.

KITCHEN UPGRADE

- DESIGNER CABINETS
- PREMIUM COUNTER-TOPS
- PREMIUM SINK AND FAUCETS
- ACCENT LIGHTS

ENVIRONMENTAL BENEFITS

- not applicable

COMFORT/LIFESTYLE

- premium quality kitchen for functional efficiency and design merit

COST: $4,000

BATHROOM UPGRADE

- LOW-PROFILE TOILET
- PREMIUM SINKS AND FAUCETS
- SHOWER STALL AND SPA-TUB IN MASTER ENSUITE

ENVIRONMENTAL BENEFITS

- not applicable

COMFORT/LIFESTYLE

- premium quality bathrooms for durability and design merit

COST: $3,100

FLOORING UPGRADE

- HARDWOOD FLOORING IN LIVING ROOM, DINING ROOM AND FAMILY ROOM
- PREMIUM CARPETING IN OTHER AREAS

ENVIRONMENTAL BENEFITS

- not applicable

COMFORT/LIFESTYLE

- premium quality flooring for durability and design merit

COST: $4,200

FRESH AIR SYSTEM

- DRAWS FRESH, FILTERED AIR INTO YOUR HOME
- REMOVES STALE INDOOR AIR AND ODOUR
- HEAT RECOVERY DEVICE

ENVIRONMENTAL BENEFITS

- provides fresh air throughout home
- reduces odours and indoor pollution
- heat recovery reduces energy use

COMFORT/LIFESTYLE

- healthier, more comfortable home
- dry, stale, "winter" air eliminated

COST: $3,000

1940 URBAN DETACHED

FEATURES

- built circa 1940
- 2,000 sq. ft., unrenovated
- two-storey
- livingroom, separate dining room
- kitchen on main floor
- three bedrooms
- 1 1/2 bathrooms
- hardwood floors
- annual energy costs: $1,771
- selling price: $220,000

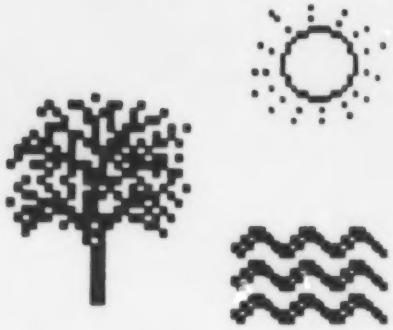
PURCHASE BUDGET: $245,000
BASE PRICE: $220,000
CAR CREDIT: $_____

OPTION PACKAGES	COST	SELECTED	COMMENTS
MORE ENERGY-EFFICIENT APPLIANCES	$400		
MOST ENERGY-EFFICIENT APPLIANCES	$900		
PURE WATER SYSTEM	$2,750		
INFORMATION CENTRE	$3,500		
WATER-SAVER PACKAGE	$1,200		
WASTE REDUCTION/RECYCLING	$1,325		
ACTIVE HOME SECURITY	$900		
LIMITED RENOVATION	$22,000		
EXTENSIVE RENOVATION	$85,000		
FRESH AIR SYSTEM	$3,000		
TOTAL		$	

(Ottawa)

1940 URBAN DETACHED

HOW THIS HOME AFFECTS THE ENVIRONMENT



Each year this home:

- consumes enough energy to drive the average car 55,000 km
  - 249,000 cubic feet of natural gas plus 8,333 kwh of electricity
    or
  - 51,940 kwh of electricity if it is all-electric
- uses enough water to fill a 20 x 30 ft. swimming pool over 7 ft. deep
  - 420,000 litres of fresh water
- produces garbage equal to the weight of two cars
  - 9.7 cubic yards of garbage weighing 5,780 pounds

The results:

- depletion of fresh water resources and additional water and sewage treatment costs
- increased demand for electricity and additional generating plants
- air pollution and depletion of non-renewable energy resources
- the need for additional solid waste disposal and its associated pollution

How energy is used:

space heating	64%
water heating	12%
lighting/appliances	24%

How water is used:

toilets	45%
bathing	28%
laundry/dishes	23%
drinking/cooking	4%

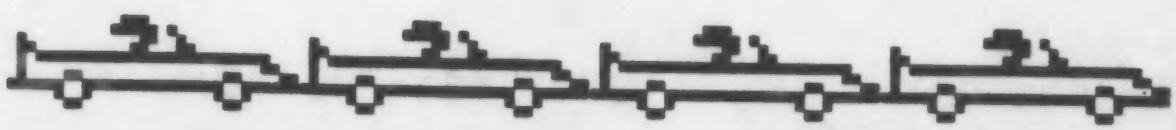
THE COST OF COMMUTING

If you commute 20 km each way to work, your annual cost of commuting, averaged over three years, might break down this way:

DEPRECIATION (annual average for $15,000 car)	$2,450
INSURANCE	800
FUEL (27 mpg/.55 litre)	563
PARKING (at workplace, $75/month)	900
SERVICE AND REPAIR	434
REGISTRATION	66
FINANCING COST ($10,000 loan/3 years/14%)	768
TOTAL ANNUAL COST	$5,981
MONTHLY COST	$ 498

At current mortage rates, the cost of operating this car would service $45,000 in principal, amortized over 25 years.

The current cost of a monthly bus pass (core service area) is $48. Annual cost of bus use is $576. This is $5,405 less per year than operating a car.



MORE ENERGY-EFFICIENT APPLIANCES

- ENERGY-EFFICIENT DISHWASHER, WASHER, DRYER, RANGE, FREEZER, REFRIGERATOR

ENVIRONMENTAL BENEFITS

- reduces energy use by 15%
- reduces need for new electrical plants

COMFORT/LIFESTYLE

- same function and convenience

COST: $400

ENERGY SAVINGS: $57/YEAR

1

MOST ENERGY-EFFICIENT APPLIANCES

- STATE-OF-THE-ART DISHWASHER, WASHER, DRYER, RANGE, FREEZER, REFRIGERATOR

ENVIRONMENTAL BENEFITS

- reduces energy use by 48%
- reduces need for new electrical plants

COMFORT/LIFESTYLE

- same function and convenience

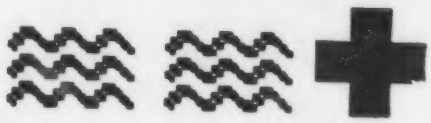
COST: $900

ENERGY SAVINGS: $182/YEAR

2

PURE WATER SYSTEM

- PURIFIED, FILTERED WATER FROM ALL FAUCETS
- CHEMICALS AND BACTERIA REMOVED FROM TAP WATER



ENVIRONMENTAL BENEFITS

- removes common chemicals from all tap-water services
- filters bacteria and odour out
- more efficient than small tap units

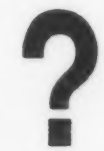
COMFORT/LIFESTYLE

- clean, clear drinking water
- one central unit eliminates individual filters

COST: $2,750

INFORMATION CENTRE

- HOME PERFORMANCE MONITOR
- ELECTRICAL MANAGER
- CONTROL CENTRE FOR HEAT AND LIGHTS



ENVIRONMENTAL BENEFITS

- reduces peak electrical load
- reduces utility pollution
- allows efficient use of home heating and lighting systems

COMFORT/LIFESTYLE

- helps you control energy and water use in your home
- helps you control utility costs
- provides heat and light control, even in your absence

COST: $3,500

WATER-SAVER PACKAGE

- WATER-EFFICIENT SHOWERS AND TOILETS

ENVIRONMENTAL BENEFITS

- reduces water use by 40%
- saves 168,000 litres per year
- conserves fresh-water supplies
- reduces water pollution

COMFORT/LIFESTYLE

- same function and convenience
- helps keep municipal costs down

COST: $540

SAVE: $230/YEAR

WASTE REDUCTION & RECYCLING

- BUILT-IN RECYCLABLE MATERIALS STORAGE
- BUILT-IN WASTE COMPACTOR
- BACKYARD COMPOST UNIT
- RAISED-BED GARDEN

ENVIRONMENTAL BENEFITS

- lets you compost all food wastes; garden uses composted wastes
- reduces household garbage sent to landfill

COMFORT/LIFESTYLE

- reduces waste clutter
- keeps garbage compact
- provides garden for recreational use

COST: $1,325

ACTIVE HOME SECURITY SYSTEM

- INTRUSION ALARMS ON ALL DOORS AND WINDOWS
- ELECTRONIC POLICE ALERT HOOK-UP

ENVIRONMENTAL BENEFITS

- not applicable

COMFORT/LIFESTYLE

- home security when you are at home or away

COST: $900 + $30/MONTH

LIMITED RENOVATION

- NEW, MORE EFFICIENT WINDOWS AND DOORS
- NEW, ENERGY-EFFICIENT GAS FURNACE
- REPLACE WIRING AND PLUMBING WHERE REQUIRED
- ATTIC INSULATION
- NEW KITCHEN CABINETS, COUNTERS AND FLOORING

ENVIRONMENTAL BENEFITS

- reduced energy use and pollution

COMFORT/LIFESTYLE

- improved comfort and convenience
- upgraded kitchen area

COST: $22,000

ENERGY SAVINGS: $379/YEAR

20

EXTENSIVE RENOVATION

- NEW, MOST EFFICIENT WINDOWS AND DOORS
- NEW, ENERGY-EFFICIENT GAS FURNACE
- REPLACE WIRING AND PLUMBING WHERE REQUIRED
- RE-INSULATION AND AIR SEALING OF EXTERIOR WALLS
- RE-DESIGN BY REMOVAL OF SOME INTERIOR WALLS
- REFINISHING OF ALL HARDWOOD FLOORS AND STAIRS
- UPGRADE OF ALL BATHROOMS
- NEW KITCHEN CABINETS, COUNTERS AND FLOORING
- PLASTER REPAIRS AND REPAINTING OF INTERIOR
- MODERN LAUNDRY ROOM IN BASEMENT

ENVIRONMENTAL BENEFITS

- greater energy savings

COMFORT/LIFESTYLE

- increased comfort and convenience
- more open living areas
- new kitchen and bathrooms
- complete interior refurbishment

COST: $85,000

ENERGY SAVINGS: $546/YEAR

21

FRESH AIR SYSTEM

- DRAWS FRESH, FILTERED AIR INTO YOUR HOME
- REMOVES STALE INDOOR AIR AND ODOUR
- HEAT RECOVERY DEVICE

ENVIRONMENTAL BENEFITS

- provides fresh air throughout home
- reduces odours and indoor pollution
- heat recovery reduces energy use

COMFORT/LIFESTYLE

- healthier, more comfortable home
- dry, stale, "winter" air eliminated

COST: $3,000

URBAN ROW/GARDEN HOME

FEATURES

- newly built
- 1,600 sq. ft.
- two-storey
- three bedrooms
- livingroom, separate dining room
- kitchen with dinette on main floor
- 1 1/2 bathrooms
- attached single garage
- annual energy costs: $1,142
- selling price: $148,000

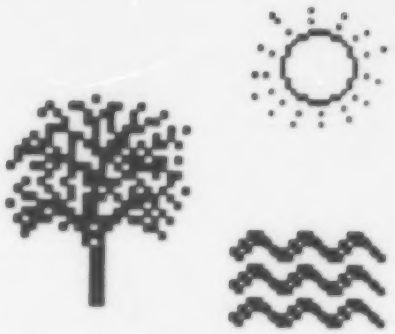
PURCHASE BUDGET: $152,000
BASE PRICE: $148,000

OPTION PACKAGES	COST	SELECTED	COMMENTS
MORE ENERGY-EFFICIENT APPLIANCES	$400		
MOST ENERGY-EFFICIENT APPLIANCES	$900		
GREEN NEIGHBOURHOOD	(-$2,000)		
PURE WATER SYSTEM	$2,750		
INFORMATION CENTRE	$3,500		
WATER-SAVER PACKAGE	$540		
WASTE REDUCTION/RECYCLING	$1,325		
ACTIVE HOME SECURITY	$650		
EFFICIENT DESIGN	(-$7,000)		
BETTER ENERGY EFFICIENCY	$2,800		
BEST ENERGY EFFICIENCY	$7,500		
HEALTHY INTERIOR	$5,800		
KITCHEN UPGRADE	$2,400		
BATHROOM UPGRADE	$2,200		
FLOORING UPGRADE	$2,000		
FRESH AIR SYSTEM	$2,700		
TOTAL	$		

(Ottawa)

URBAN ROW/GARDEN HOME

HOW THIS HOME AFFECTS THE ENVIRONMENT



Each year this home:

- consumes enough energy to drive the average car 28,000 km
  - 111,310 cubic feet of natural gas plus 7,778 kwh of electricity
    or
  - 26,388 kwh of electricity if it is all-electric
- uses enough water to fill a 20 x 30 ft. swimming pool over 7 ft. deep
  - 420,000 litres of fresh water
- produces garbage equal to the weight of two cars
  - 9.7 cubic yards of garbage weighing 5,780 pounds

The results:

- depletion of fresh water resources and additional water and sewage treatment costs
- increased demand for electricity and additional generating plants
- air pollution and depletion of non-renewable energy resources
- the need for additional solid waste disposal and its associated pollution

How energy is used:

space heating	64%
water heating	12%
lighting/appliances	24%

How water is used:

toilets	45%
bathing	28%
laundry/dishes	23%
drinking/cooking	4%

MORE ENERGY-EFFICIENT APPLIANCES

- ENERGY-EFFICIENT DISHWASHER, WASHER, DRYER, RANGE, FREEZER, REFRIGERATOR

ENVIRONMENTAL BENEFITS

- reduces energy use by 15%
- reduces need for new electrical plants

COMFORT/LIFESTYLE

- same function and convenience

COST: $400

ENERGY SAVINGS: $57/YEAR

1

MOST ENERGY-EFFICIENT APPLIANCES

- STATE-OF-THE-ART DISHWASHER, WASHER, DRYER, RANGE, FREEZER, REFRIGERATOR

ENVIRONMENTAL BENEFITS

- reduces energy use by 48%
- reduces need for new electrical plants

COMFORT/LIFESTYLE

- same function and convenience

COST: $900

ENERGY SAVINGS: $182/YEAR

2

GREEN NEIGHBOURHOOD

- HOMES SET ON SMALLER LOTS, REDUCED FRONT SETBACK
- PRIVATE DECK AREA IN BACK
- COMMON-USE "GREEN COURT" IN PLACE OF BACK YARD

ENVIRONMENTAL BENEFITS

- 15% less land used

COMFORT/LIFESTYLE

- twelve homes share private "green court" area
- shared land maintenance
- private deck for outdoor cooking, entertaining, etc.

COST REDUCTION: $2,000

PURE WATER SYSTEM

- PURIFIED, FILTERED WATER FROM ALL FAUCETS
- CHEMICALS AND BACTERIA REMOVED FROM TAP WATER

ENVIRONMENTAL BENEFITS

- removes common chemicals from all tap-water services
- filters bacteria and odour out
- more efficient than small tap units

COMFORT/LIFESTYLE

- clean, clear drinking water
- one central unit eliminates individual filters

COST: $2,750

INFORMATION CENTRE

- HOME PERFORMANCE MONITOR
- ELECTRICAL MANAGER
- CONTROL CENTRE FOR HEAT AND LIGHTS

ENVIRONMENTAL BENEFITS

- reduces peak electrical load
- reduces utility pollution
- allows efficient use of home heating and lighting systems

COMFORT/LIFESTYLE

- helps you control energy and water use in your home
- helps you control utility costs
- provides heat and light control, even in your absence

COST: $3,500

WATER-SAVER PACKAGE

- **WATER-EFFICIENT SHOWERS AND TOILETS**

ENVIRONMENTAL BENEFITS

- reduces water use by 40%
- saves 168,000 litres per year
- conserves fresh-water supplies
- reduces water pollution

COMFORT/LIFESTYLE

- same function and convenience
- helps keep municipal costs down

COST: $1,200

SAVE: $230/YEAR

WASTE REDUCTION & RECYCLING

- BUILT-IN RECYCLABLE MATERIALS STORAGE
- BUILT-IN WASTE COMPACTOR
- BACKYARD COMPOST UNIT
- RAISED-BED GARDEN

ENVIRONMENTAL BENEFITS

- lets you compost all food wastes; garden uses composted wastes
- reduces household garbage sent to landfill

COMFORT/LIFESTYLE

- reduces waste clutter
- keeps garbage compact
- provides garden for recreational use

COST: $1,325

ACTIVE HOME SECURITY SYSTEM

- INTRUSION ALARMS ON ALL DOORS AND WINDOWS
- ELECTRONIC POLICE ALERT HOOK-UP

ENVIRONMENTAL BENEFITS

- not applicable

COMFORT/LIFESTYLE

- home security when you are at home or away

COST: $650 + $30/MONTH

EFFICIENT DESIGN PACKAGE

- EFFECTIVE USE OF INTERIOR AREAS
- MINIMUM "DEAD SPACE"
- OPEN-CONCEPT LOWER LEVEL AREAS
- SPACE-EFFICIENT BATHROOMS AND LAUNDRY
- LOWER LEVEL "WATER CLOSET"
- FLOOR AREA OF 1,400 SQ. FT.

ENVIRONMENTAL BENEFITS

- less materials used
- reduces energy use 7%

COMFORT/LIFESTYLE

- maximum useable space
- more open, flexible living areas
- same features and convenience

COST REDUCTION: $7,000

ENERGY SAVINGS: $98/YEAR

BETTER ENERGY EFFICIENCY

- BETTER DOORS, WINDOWS
- EXTRA INSULATION AND AIR SEALING
- HIGH-EFFICIENCY GAS/ELECTRIC HEAT
- HIGH-EFFICIENCY WATER HEATER

ENVIRONMENTAL BENEFITS

- reduces energy use by 20%
- less carbon dioxide; less need for new electrical plants

COMFORT/LIFESTYLE

- draft-free
- even temperatures
- cooler in summer
- less noise

COST: $2,800

ENERGY SAVINGS: $222/YEAR

15

BEST ENERGY EFFICIENCY

- STATE-OF-THE-ART DOORS AND WINDOWS
- EXTRA INSULATION AND AIR SEALING
- SUPER-EFFICIENT GAS/ELECTRIC HEAT PUMP
- HIGH-EFFICIENCY LIGHTING

ENVIRONMENTAL BENEFITS

- reduces energy use by 40%
- less carbon dioxide, or less need for new electrical plants

COMFORT/LIFESTYLE

- draft-free
- even temperatures
- cooler in summer
- less noise

COST: $7,500

ENERGY SAVINGS: $460/YEAR

17

HEALTHY INTERIOR

- HARDWOOD FLOORS IN ALL ROOMS EXCEPT KITCHEN AND BATHROOMS
- LOW-TOXICITY PAINTS AND FINISHES
- SOLID WOOD CABINETRY AND COUNTERTOPS
- MINIMUM USE OF SYNTHETIC MATERIALS

ENVIRONMENTAL BENEFITS

- less chemical pollution of indoor air
- less use of environmentally destructive materials

COMFORT/LIFESTYLE

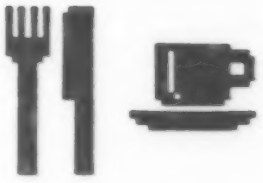
- healthier air
- less allergy-producing interior

COST: $5,800

Flooring and kitchen upgrades NOT available in combination with this option.

KITCHEN UPGRADE

- DESIGNER CABINETS
- PREMIUM COUNTER-TOPS
- PREMIUM SINK AND FAUCETS
- ACCENT LIGHTS



ENVIRONMENTAL BENEFITS

- not applicable

COMFORT/LIFESTYLE

- premium quality kitchen for functional efficiency and design merit

COST: $2,400

BATHROOM UPGRADE

- LOW-PROFILE TOILET
- PREMIUM SINKS AND FAUCETS
- SHOWER STALL AND SPA-TUB IN BOTH UPSTAIRS BATHROOMS

ENVIRONMENTAL BENEFITS

- not applicable

COMFORT/LIFESTYLE

- premium quality bathrooms for durability and design merit

COST: $2,200

FLOORING UPGRADE

- HARDWOOD FLOORING IN LIVING ROOM AND DINING ROOM
- PREMIUM CARPETING IN OTHER AREAS

ENVIRONMENTAL BENEFITS

- not applicable

COMFORT/LIFESTYLE

- premium quality flooring for durability and design merit

COST: $2,000

FRESH AIR SYSTEM

- DRAWS FRESH, FILTERED AIR INTO YOUR HOME
- REMOVES STALE INDOOR AIR AND ODOUR
- HEAT RECOVERY DEVICE

ENVIRONMENTAL BENEFITS

- provides fresh air throughout home
- reduces odours and indoor pollution
- heat recovery reduces energy use

COMFORT/LIFESTYLE

- healthier, more comfortable home
- dry, stale, "winter" air eliminated

COST: $2,700

Peterborough

SUBURBAN/RURAL DETACHED

FEATURES

- newly built
- 2,800 sq. ft.
- two-storey
- three bedrooms + optional den
- 2 1/2 baths, incl. master ensuite
- livingroom, separate dining room
- kitchen with eat-in area
- main-floor laundry
- attached double garage
- annual energy costs: $2,730
- selling price: $225,000

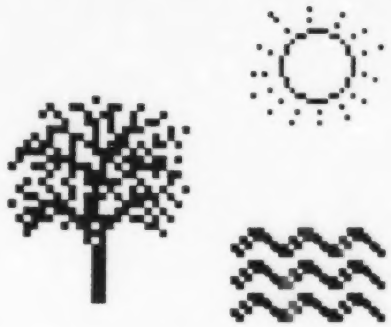
PURCHASE BUDGET: $240,000
BASE PRICE: $225,000

OPTION PACKAGES	COST	SELECTED	COMMENTS
MORE ENERGY-EFFICIENT APPLIANCES	$400		
MOST ENERGY-EFFICIENT APPLIANCES	$900		
GREEN NEIGHBOURHOOD	(-$3,500)		
PURE WATER SYSTEM	$2,750		
INFORMATION CENTRE	$3,500		
WATER-SAVER PACKAGE	$850		
WASTE REDUCTION/RECYCLING	$1,325		
ACTIVE HOME SECURITY	$900		
EFFICIENT DESIGN	(-$12,000)		
BETTER ENERGY EFFICIENCY	$4,900		
BEST ENERGY EFFICIENCY	$12,500		
HEALTHY INTERIOR	$9,600		
KITCHEN UPGRADE	$4,000		
BATHROOM UPGRADE	$3,100		
FLOORING UPGRADE	$4,200		
FRESH AIR SYSTEM	$3,000		
TOTAL	$		

(Peterborough)

SUBURBAN/RURAL DETACHED

HOW THIS HOME AFFECTS THE ENVIRONMENT



Each year this home:

- consumes enough energy to drive the average car 41,000 km
  - 173,000 cubic feet of natural gas plus 9,444 kwh of electricity
    or
  - 39,165 kwh of electricity if it is all-electric
- uses enough water to fill a 20 x 30 ft. swimming pool over 7 ft. deep
  - 420,000 litres of fresh water
- produces garbage equal to the weight of two cars
  - 9.7 cubic yards of garbage weighing 5,780 pounds

The results:

- depletion of fresh water resources and additional water and sewage treatment costs
- increased demand for electricity and additional generating plants
- air pollution and depletion of non-renewable energy resources
- the need for additional solid waste disposal and its associated pollution

How energy is used:

space heating	64%
water heating	12%
lighting/appliances	24%

How water is used:

toilets	45%
bathing	28%
laundry/dishes	23%
drinking/cooking	4%

MORE ENERGY-EFFICIENT APPLIANCES

- ENERGY-EFFICIENT DISHWASHER, WASHER, DRYER, RANGE, FREEZER, REFRIGERATOR

ENVIRONMENTAL BENEFITS

- reduces energy use by 15%
- reduces need for new electrical plants

COMFORT/LIFESTYLE

- same function and convenience

COST: $400

ENERGY SAVINGS: $57/YEAR

1

MOST ENERGY-EFFICIENT APPLIANCES

- STATE-OF-THE-ART DISHWASHER, WASHER, DRYER, RANGE, FREEZER, REFRIGERATOR

ENVIRONMENTAL BENEFITS

- reduces energy use by 48%
- reduces need for new electrical plants

COMFORT/LIFESTYLE

- same function and convenience

COST: $900

ENERGY SAVINGS: $182/YEAR

2

GREEN NEIGHBOURHOOD

- HOMES SET ON SMALLER LOTS, REDUCED FRONT SETBACK
- PRIVATE DECK AREA IN BACK
- COMMON-USE "GREEN COURT" IN PLACE OF BACK YARD

ENVIRONMENTAL BENEFITS

- 15% less land used

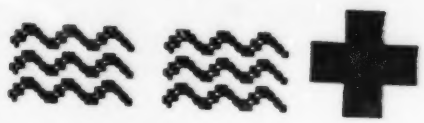
COMFORT/LIFESTYLE

- twelve homes share private "green court" area
- shared land maintenance
- private deck for outdoor cooking, entertaining, etc.

COST REDUCTION: $3,500

PURE WATER SYSTEM

- PURIFIED, FILTERED WATER FROM ALL FAUCETS
- CHEMICALS AND BACTERIA REMOVED FROM TAP WATER



ENVIRONMENTAL BENEFITS

- removes common chemicals from all tap-water services
- filters bacteria and odour out
- more efficient than small tap units

COMFORT/LIFESTYLE

- clean, clear drinking water
- one central unit eliminates individual filters

COST: $2,750

INFORMATION CENTRE

- HOME PERFORMANCE MONITOR
- ELECTRICAL MANAGER
- CONTROL CENTRE FOR HEAT AND LIGHTS

ENVIRONMENTAL BENEFITS

- reduces peak electrical load
- reduces utility pollution
- allows efficient use of home heating and lighting systems

COMFORT/LIFESTYLE

- helps you control energy and water use in your home
- helps you control utility costs
- provides heat and light control, even in your absence

COST: $3,500

WATER-SAVER PACKAGE

- WATER-EFFICIENT SHOWERS AND TOILETS

ENVIRONMENTAL BENEFITS

- reduces water use by 40%
- saves 168,000 litres per year
- conserves fresh-water supplies
- reduces water pollution

COMFORT/LIFESTYLE

- same function and convenience
- helps keep municipal costs down

COST: $850

SAVE: $25/YEAR

WASTE REDUCTION & RECYCLING

- BUILT-IN RECYCLABLE MATERIALS STORAGE
- BUILT-IN WASTE COMPACTOR
- BACKYARD COMPOST UNIT
- RAISED-BED GARDEN

ENVIRONMENTAL BENEFITS

- lets you compost all food wastes; garden uses composted wastes
- reduces household garbage sent to landfill

COMFORT/LIFESTYLE

- reduces waste clutter
- keeps garbage compact
- provides garden for recreational use

COST: $1,325

ACTIVE HOME SECURITY SYSTEM

- INTRUSION ALARMS ON ALL DOORS AND WINDOWS
- ELECTRONIC POLICE ALERT HOOK-UP

ENVIRONMENTAL BENEFITS

- not applicable

COMFORT/LIFESTYLE

- home security when you are at home or away

COST: $900 + $30/MONTH

EFFICIENT DESIGN PACKAGE

- EFFECTIVE USE OF INTERIOR AREAS
- MINIMUM "DEAD SPACE"
- OPEN-CONCEPT LOWER LEVEL AREAS
- SPACE-EFFICIENT BATHROOMS AND LAUNDRY
- LOWER LEVEL "WATER CLOSET"
- FLOOR AREA OF 2,400 SQ. FT.

ENVIRONMENTAL BENEFITS

- less materials used
- lower energy use

COMFORT/LIFESTYLE

- maximum useable space
- more open, flexible living areas
- same features and convenience

COST REDUCTION: $12,000 ENERGY SAVINGS: $168/YEAR

BETTER ENERGY EFFICIENCY

- BETTER DOORS, WINDOWS
- EXTRA INSULATION AND AIR SEALING
- HIGH-EFFICIENCY WATER HEATER

ENVIRONMENTAL BENEFITS

- reduces energy use by 30%
- less carbon dioxide; less need for new electrical plants

COMFORT/LIFESTYLE

- draft-free
- even temperatures
- cooler in summer
- less noise

COST: $4,900

ENERGY SAVINGS: $723/YEAR

14

BEST ENERGY EFFICIENCY

- STATE-OF-THE-ART DOORS AND WINDOWS
- EXTRA INSULATION AND AIR SEALING
- SUPER-EFFICIENT GAS/ELECTRIC HEAT PUMP
- HIGH-EFFICIENCY LIGHTING

ENVIRONMENTAL BENEFITS

- reduces energy use by 52%
- less carbon dioxide, or less need for new electrical plants

COMFORT/LIFESTYLE

- draft-free
- even temperatures
- cooler in summer
- less noise

COST: $12,500

ENERGY SAVINGS: $1,247/YEAR

16

HEALTHY INTERIOR

- HARDWOOD FLOORS IN ALL ROOMS EXCEPT KITCHEN AND BATHROOMS
- LOW-TOXICITY PAINTS AND FINISHES
- SOLID WOOD CABINETRY AND COUNTERTOPS
- MINIMUM USE OF SYNTHETIC MATERIALS

ENVIRONMENTAL BENEFITS

- less chemical pollution of indoor air
- less use of environmentally destructive materials

COMFORT/LIFESTYLE

- healthier air
- less allergy-producing interior

COST: $9,600

Flooring and kitchen upgrades NOT available in combination with this option.

KITCHEN UPGRADE

- DESIGNER CABINETS
- PREMIUM COUNTER-TOPS
- PREMIUM SINK AND FAUCETS
- ACCENT LIGHTS

ENVIRONMENTAL BENEFITS

- not applicable

COMFORT/LIFESTYLE

- premium quality kitchen for functional efficiency and design merit

COST: $4,000

BATHROOM UPGRADE

- LOW-PROFILE TOILET
- PREMIUM SINKS AND FAUCETS
- SHOWER STALL AND SPA-TUB IN MASTER ENSUITE

ENVIRONMENTAL BENEFITS

- not applicable

COMFORT/LIFESTYLE

- premium quality bathrooms for durability and design merit

COST: $3,100

FLOORING UPGRADE

- HARDWOOD FLOORING IN LIVING ROOM, DINING ROOM AND FAMILY ROOM
- PREMIUM CARPETING IN OTHER AREAS

ENVIRONMENTAL BENEFITS

- not applicable

COMFORT/LIFESTYLE

- premium quality flooring for durability and design merit

COST: $4,200

FRESH AIR SYSTEM

- DRAWS FRESH, FILTERED AIR INTO YOUR HOME
- REMOVES STALE INDOOR AIR AND ODOUR
- HEAT RECOVERY DEVICE

ENVIRONMENTAL BENEFITS

- provides fresh air throughout home
- reduces odours and indoor pollution
- heat recovery reduces energy use

COMFORT/LIFESTYLE

- healthier, more comfortable home
- dry, stale, "winter" air eliminated

COST: $3,000

1940 URBAN DETACHED

FEATURES

- built circa 1940
- 2,000 sq. ft., unrenovated
- two-storey
- livingroom, separate dining room
- kitchen on main floor
- three bedrooms
- 1 1/2 bathrooms
- hardwood floors
- annual energy costs: $1,873
- selling price: $165,000

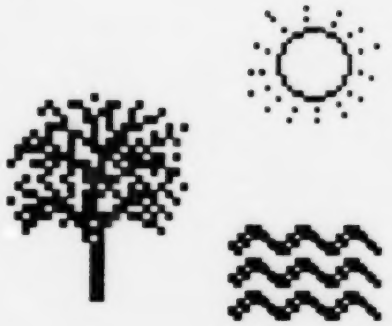
PURCHASE BUDGET: $205,000
BASE PRICE: $165,000
CAR CREDIT: $_____

OPTION PACKAGES	COST	SELECTED	COMMENTS
MORE ENERGY-EFFICIENT APPLIANCES	$400		
MOST ENERGY-EFFICIENT APPLIANCES	$900		
PURE WATER SYSTEM	$2,750		
INFORMATION CENTRE	$3,500		
WATER-SAVER PACKAGE	$1,200		
WASTE REDUCTION/RECYCLING	$1,325		
ACTIVE HOME SECURITY	$900		
LIMITED RENOVATION	$22,000		
EXTENSIVE RENOVATION	$85,000		
FRESH AIR SYSTEM	$3,000		
TOTAL	$		

(Peterborough)

1940 URBAN DETACHED

HOW THIS HOME AFFECTS THE ENVIRONMENT



Each year this home:

- consumes enough energy to drive the average car 55,000 km
  - 249,000 cubic feet of natural gas plus 8,333 kwh of electricity
    or
  - 51,940 kwh of electricity if it is all-electric
- uses enough water to fill a 20 x 30 ft. swimming pool over 7 ft. deep
  - 420,000 litres of fresh water
- produces garbage equal to the weight of two cars
  - 9.7 cubic yards of garbage weighing 5,780 pounds

The results:

- depletion of fresh water resources and additional water and sewage treatment costs
- increased demand for electricity and additional generating plants
- air pollution and depletion of non-renewable energy resources
- the need for additional solid waste disposal and its associated pollution

How energy is used:

space heating	64%
water heating	12%
lighting/appliances	24%

How water is used:

toilets	45%
bathing	28%
laundry/dishes	23%
drinking/cooking	4%

THE COST OF COMMUTING

If you commute 20 km each way to work, your annual cost of commuting, averaged over three years, might break down this way:

DEPRECIATION (annual average for $15,000 car)	$2,450
INSURANCE	800
FUEL (27 mpg/.55 litre)	563
PARKING (at workplace, $75/month)	900
SERVICE AND REPAIR	434
REGISTRATION	66
FINANCING COST ($10,000 loan/3 years/14%)	768
TOTAL ANNUAL COST	$5,981
MONTHLY COST	$ 498

At current mortage rates, the cost of operating this car would service $45,000 in principal, amortized over 25 years.

The current cost of a monthly bus pass (core service area) is $48. Annual cost of bus use is $576. This is $5,405 less per year than operating a car.

MORE ENERGY-EFFICIENT APPLIANCES

- ENERGY-EFFICIENT DISHWASHER, WASHER, DRYER, RANGE, FREEZER, REFRIGERATOR

ENVIRONMENTAL BENEFITS

- reduces energy use by 15%
- reduces need for new electrical plants

COMFORT/LIFESTYLE

- same function and convenience

COST: $400

ENERGY SAVINGS: $57/YEAR

1

MOST ENERGY-EFFICIENT APPLIANCES

- STATE-OF-THE-ART DISHWASHER, WASHER, DRYER, RANGE, FREEZER, REFRIGERATOR

ENVIRONMENTAL BENEFITS

- reduces energy use by 48%
- reduces need for new electrical plants

COMFORT/LIFESTYLE

- same function and convenience

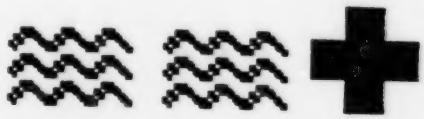
COST: $900

ENERGY SAVINGS: $182/YEAR

2

PURE WATER SYSTEM

- PURIFIED, FILTERED WATER FROM ALL FAUCETS
- CHEMICALS AND BACTERIA REMOVED FROM TAP WATER



ENVIRONMENTAL BENEFITS

- removes common chemicals from all tap-water services
- filters bacteria and odour out
- more efficient than small tap units

COMFORT/LIFESTYLE

- clean, clear drinking water
- one central unit eliminates individual filters

COST: $2,750

INFORMATION CENTRE

- HOME PERFORMANCE MONITOR
- ELECTRICAL MANAGER
- CONTROL CENTRE FOR HEAT AND LIGHTS

ENVIRONMENTAL BENEFITS

- reduces peak electrical load
- reduces utility pollution
- allows efficient use of home heating and lighting systems

COMFORT/LIFESTYLE

- helps you control energy and water use in your home
- helps you control utility costs
- provides heat and light control, even in your absence

COST: $3,500

WATER-SAVER PACKAGE

- WATER-EFFICIENT SHOWERS AND TOILETS

ENVIRONMENTAL BENEFITS

- reduces water use by 40%
- saves 168,000 litres per year
- conserves fresh-water supplies
- reduces water pollution

COMFORT/LIFESTYLE

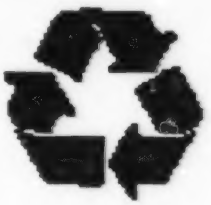
- same function and convenience
- helps keep municipal costs down

COST: $1,200

SAVE: $25/YEAR

WASTE REDUCTION & RECYCLING

- BUILT-IN RECYCLABLE MATERIALS STORAGE
- BUILT-IN WASTE COMPACTOR
- BACKYARD COMPOST UNIT
- RAISED-BED GARDEN



ENVIRONMENTAL BENEFITS

- lets you compost all food wastes; garden uses composted wastes
- reduces household garbage sent to landfill

COMFORT/LIFESTYLE

- reduces waste clutter
- keeps garbage compact
- provides garden for recreational use

COST: $1,325

ACTIVE HOME SECURITY SYSTEM

- INTRUSION ALARMS ON ALL DOORS AND WINDOWS
- ELECTRONIC POLICE ALERT HOOK-UP

ENVIRONMENTAL BENEFITS

- not applicable

COMFORT/LIFESTYLE

- home security when you are at home or away

COST: $900 + $30/MONTH

LIMITED RENOVATION

- NEW, MORE EFFICIENT WINDOWS AND DOORS
- NEW, ENERGY-EFFICIENT GAS FURNACE
- REPLACE WIRING AND PLUMBING WHERE REQUIRED
- ATTIC INSULATION
- NEW KITCHEN CABINETS, COUNTERS AND FLOORING

ENVIRONMENTAL BENEFITS

- reduced energy use and pollution

COMFORT/LIFESTYLE

- improved comfort and convenience
- upgraded kitchen area

COST: $22,000

ENERGY SAVINGS: $379/YEAR

EXTENSIVE RENOVATION

- NEW, MOST EFFICIENT WINDOWS AND DOORS
- NEW, ENERGY-EFFICIENT GAS FURNACE
- REPLACE WIRING AND PLUMBING WHERE REQUIRED
- RE-INSULATION AND AIR SEALING OF EXTERIOR WALLS
- RE-DESIGN BY REMOVAL OF SOME INTERIOR WALLS
- REFINISHING OF ALL HARDWOOD FLOORS AND STAIRS
- UPGRADE OF ALL BATHROOMS
- NEW KITCHEN CABINETS, COUNTERS AND FLOORING
- PLASTER REPAIRS AND REPAINTING OF INTERIOR
- MODERN LAUNDRY ROOM IN BASEMENT

ENVIRONMENTAL BENEFITS

- greater energy savings

COMFORT/LIFESTYLE

- increased comfort and convenience
- more open living areas
- new kitchen and bathrooms
- complete interior refurbishment

COST: $85,000

ENERGY SAVINGS: $546/YEAR

URBAN ROW/GARDEN HOME

FEATURES

- newly built
- 1,600 sq. ft.
- two-storey
- three bedrooms
- livingroom, separate dining room
- kitchen with dinette on main floor
- 1 1/2 bathrooms
- attached single garage
- annual energy costs: $1,242
- selling price: $135,000

PURCHASE BUDGET: $139,000
BASE PRICE: $135,000

OPTION PACKAGES	COST	SELECTED	COMMENTS
MORE ENERGY-EFFICIENT APPLIANCES	$400		
MOST ENERGY-EFFICIENT APPLIANCES	$900		
GREEN NEIGHBOURHOOD	(-$2,000)		
PURE WATER SYSTEM	$2,750		
INFORMATION CENTRE	$3,500		
WATER-SAVER PACKAGE	$540		
WASTE REDUCTION/RECYCLING	$1,325		
ACTIVE HOME SECURITY	$650		
EFFICIENT DESIGN	(-$7,000)		
BETTER ENERGY EFFICIENCY	$2,800		
BEST ENERGY EFFICIENCY	$7,500		
HEALTHY INTERIOR	$5,800		
KITCHEN UPGRADE	$2,400		
BATHROOM UPGRADE	$2,200		
FLOORING UPGRADE	$2,000		
FRESH AIR SYSTEM	$2,700		
TOTAL	$		

(Peterborough)

FRESH AIR SYSTEM

- DRAWS FRESH, FILTERED AIR INTO YOUR HOME
- REMOVES STALE INDOOR AIR AND ODOUR
- HEAT RECOVERY DEVICE

ENVIRONMENTAL BENEFITS

- provides fresh air throughout home
- reduces odours and indoor pollution
- heat recovery reduces energy use

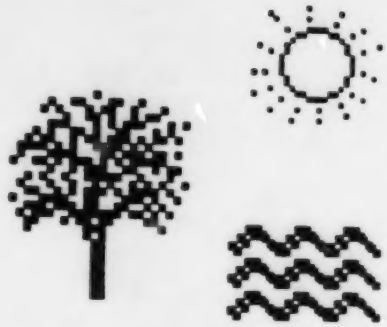
COMFORT/LIFESTYLE

- healthier, more comfortable home
- dry, stale, "winter" air eliminated

COST: $3,000

URBAN ROW/GARDEN HOME

HOW THIS HOME AFFECTS THE ENVIRONMENT



Each year this home:

- consumes enough energy to drive the average car 28,000 km
  - 111,310 cubic feet of natural gas plus 7,778 kwh of electricity
    or
  - 26,388 kwh of electricity if it is all-electric
- uses enough water to fill a 20 x 30 ft. swimming pool over 7 ft. deep
  - 420,000 litres of fresh water
- produces garbage equal to the weight of two cars
  - 9.7 cubic yards of garbage weighing 5,780 pounds

The results:

- depletion of fresh water resources and additional water and sewage treatment costs
- increased demand for electricity and additional generating plants
- air pollution and depletion of non-renewable energy resources
- the need for additional solid waste disposal and its associated pollution

How energy is used:

space heating	64%
water heating	12%
lighting/appliances	24%

How water is used:

toilets	45%
bathing	28%
laundry/dishes	23%
drinking/cooking	4%

MORE ENERGY-EFFICIENT APPLIANCES

- ENERGY-EFFICIENT DISHWASHER, WASHER, DRYER, RANGE, FREEZER, REFRIGERATOR

ENVIRONMENTAL BENEFITS

- reduces energy use by 15%
- reduces need for new electrical plants

COMFORT/LIFESTYLE

- same function and convenience

COST: $400

ENERGY SAVINGS: $57/YEAR

1

MOST ENERGY-EFFICIENT APPLIANCES

- STATE-OF-THE-ART DISHWASHER, WASHER, DRYER, RANGE, FREEZER, REFRIGERATOR

ENVIRONMENTAL BENEFITS

- reduces energy use by 48%
- reduces need for new electrical plants

COMFORT/LIFESTYLE

- same function and convenience

COST: $900

ENERGY SAVINGS: $182/YEAR

2

GREEN NEIGHBOURHOOD

- HOMES SET ON SMALLER LOTS, REDUCED FRONT SETBACK
- PRIVATE DECK AREA IN BACK
- COMMON-USE "GREEN COURT" IN PLACE OF BACK YARD

ENVIRONMENTAL BENEFITS

- 15% less land used

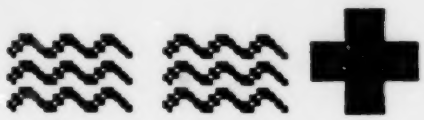
COMFORT/LIFESTYLE

- twelve homes share private "green court" area
- shared land maintenance
- private deck for outdoor cooking, entertaining, etc.

COST REDUCTION: $2,000

PURE WATER SYSTEM

- PURIFIED, FILTERED WATER FROM ALL FAUCETS
- CHEMICALS AND BACTERIA REMOVED FROM TAP WATER



ENVIRONMENTAL BENEFITS

- removes common chemicals from all tap-water services
- filters bacteria and odour out
- more efficient than small tap units

COMFORT/LIFESTYLE

- clean, clear drinking water
- one central unit eliminates individual filters

COST: $2,750

INFORMATION CENTRE

- HOME PERFORMANCE MONITOR
- ELECTRICAL MANAGER
- CONTROL CENTRE FOR HEAT AND LIGHTS

ENVIRONMENTAL BENEFITS

- reduces peak electrical load
- reduces utility pollution
- allows efficient use of home heating and lighting systems

COMFORT/LIFESTYLE

- helps you control energy and water use in your home
- helps you control utility costs
- provides heat and light control, even in your absence

COST: $3,500

WATER-SAVER PACKAGE

- WATER-EFFICIENT SHOWERS AND TOILETS

ENVIRONMENTAL BENEFITS

- reduces water use by 40%
- saves 168,000 litres per year
- conserves fresh-water supplies
- reduces water pollution

COMFORT/LIFESTYLE

- same function and convenience
- helps keep municipal costs down

COST: $540

SAVE: $25/YEAR

WASTE REDUCTION & RECYCLING

- BUILT-IN RECYCLABLE MATERIALS STORAGE
- BUILT-IN WASTE COMPACTOR
- BACKYARD COMPOST UNIT
- RAISED-BED GARDEN

ENVIRONMENTAL BENEFITS

- lets you compost all food wastes; garden uses composted wastes
- reduces household garbage sent to landfill

COMFORT/LIFESTYLE

- reduces waste clutter
- keeps garbage compact
- provides garden for recreational use

COST: $1,325

ACTIVE HOME SECURITY SYSTEM

- INTRUSION ALARMS ON ALL DOORS AND WINDOWS
- ELECTRONIC POLICE ALERT HOOK-UP

ENVIRONMENTAL BENEFITS

- not applicable

COMFORT/LIFESTYLE

- home security when you are at home or away

COST: $650 + $30/MONTH

EFFICIENT DESIGN PACKAGE

- EFFECTIVE USE OF INTERIOR AREAS
- MINIMUM "DEAD SPACE"
- OPEN-CONCEPT LOWER LEVEL AREAS
- SPACE-EFFICIENT BATHROOMS AND LAUNDRY
- LOWER LEVEL "WATER CLOSET"
- FLOOR AREA OF 1,[illegible]0 SQ. FT.

ENVIRONMENTAL BENEFITS

- less materials used
- reduces energy use 7%

COMFORT/LIFESTYLE

- maximum useable space
- more open, flexible living areas
- same features and convenience

COST REDUCTION: $7,000

ENERGY SAVINGS: $98/YEAR

BETTER ENERGY EFFICIENCY

- BETTER DOORS, WINDOWS
- EXTRA INSULATION AND AIR SEALING
- HIGH-EFFICIENCY GAS/ELECTRIC HEAT
- HIGH-EFFICIENCY WATER HEATER

ENVIRONMENTAL BENEFITS

- reduces energy use by 20%
- less carbon dioxide; less need for new electrical plants

COMFORT/LIFESTYLE

- draft-free
- even temperatures
- cooler in summer
- less noise

COST: $2,800

ENERGY SAVINGS: $222/YEAR

15

BEST ENERGY EFFICIENCY

- STATE-OF-THE-ART DOORS AND WINDOWS
- EXTRA INSULATION AND AIR SEALING
- SUPER-EFFICIENT GAS/ELECTRIC HEAT PUMP
- HIGH-EFFICIENCY LIGHTING

ENVIRONMENTAL BENEFITS

- reduces energy use by 40%
- less carbon dioxide, or less need for new electrical plants

COMFORT/LIFESTYLE

- draft-free
- even temperatures
- cooler in summer
- less noise

COST: $7,500

ENERGY SAVINGS: $460/YEAR

17

HEALTHY INTERIOR

- HARDWOOD FLOORS IN ALL ROOMS EXCEPT KITCHEN AND BATHROOMS
- LOW-TOXICITY PAINTS AND FINISHES
- SOLID WOOD CABINETRY AND COUNTERTOPS
- MINIMUM USE OF SYNTHETIC MATERIALS

ENVIRONMENTAL BENEFITS

- less chemical pollution of indoor air
- less use of environmentally destructive materials

COMFORT/LIFESTYLE

- healthier air
- less allergy-producing interior

COST: $5,800

Flooring and kitchen upgrades NOT available in combination with this option.

KITCHEN UPGRADE

- DESIGNER CABINETS
- PREMIUM COUNTER-TOPS
- PREMIUM SINK AND FAUCETS
- ACCENT LIGHTS

ENVIRONMENTAL BENEFITS

- not applicable

COMFORT/LIFESTYLE

- premium quality kitchen for functional efficiency and design merit

COST: $2,400

BATHROOM UPGRADE

- LOW-PROFILE TOILET
- PREMIUM SINKS AND FAUCETS
- SHOWER STALL AND SPA-TUB IN BOTH UPSTAIRS BATHROOMS

ENVIRONMENTAL BENEFITS

- not applicable

COMFORT/LIFESTYLE

- premium quality bathrooms for durability and design merit

COST: $2,200

FLOORING UPGRADE

- HARDWOOD FLOORING IN LIVING ROOM AND DINING ROOM
- PREMIUM CARPETING IN OTHER AREAS

ENVIRONMENTAL BENEFITS

- not applicable

COMFORT/LIFESTYLE

- premium quality flooring for durability and design merit

COST: $2,000

FRESH AIR SYSTEM

- DRAWS FRESH, FILTERED AIR INTO YOUR HOME
- REMOVES STALE INDOOR AIR AND ODOUR
- HEAT RECOVERY DEVICE

ENVIRONMENTAL BENEFITS

- provides fresh air throughout home
- reduces odours and indoor pollution
- heat recovery reduces energy use

COMFORT/LIFESTYLE

- healthier, more comfortable home
- dry, stale, "winter" air eliminated

COST: $2,700